AMERICAN JOURNAL *of* PHARMACY

SINCE 1825

A Record of the Progress of Pharmacy and the Allied Sciences

Vol. 96 APRIL, 1924 No. 4

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Price $3.00 per Annum in Advance. Foreign Postage, 25 Cents Extra.
Single Numbers, 30 Cents. Back Numbers, 50 Cents.

Entered as Second-Class Matter at the Post Office at Philadelphia, Pa., Under the Act of March 3, 1879.

Acceptance for Mailing at Special Rate of Postage Provided for in Section 1103, Act of October 3, 1917. Authorized February 15, 1920.

PUBLISHED MONTHLY BY THE

Philadelphia College of Pharmacy and Science

145 North Tenth Street, Philadelphia

American Journal of Pharmacy

ESTABLISHED IN 1825

Four preliminary numbers were published at different times until in 1829, when the publication of the regular volumes began. Since then the publication has been uninterrupted. During the period from 1829 to 1852 four numbers were published annually, except in 1847, when five numbers were published. From 1853 to 1870 six numbers were published. Since this time twelve numbers have been published annually.

MANUSCRIPTS should be sent to the Editor. It should be stated in this connection that the Editor does not assume any responsibility in connection with the views or investigations of contributors, other than to exercise general care in the selection of matter.

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	2 pp.	4 pp.	8 pp.	16 pp.	COVERS WITH TITLES
25 copies.....	$2.25	$3.75	$7.75	$9.00	25 copies..... $1.75
50 "	2.50	4.00	8.25	9.75	50 " 2.00
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THE AMERICAN
JOURNAL OF PHARMACY

VOL. 96. APRIL, 1924. NO. 4.

EDITORIAL

A HOME FOR AMERICAN PHARMACY.

No organization can function to good advantage without a definitely located headquarters and at least one full time adequately paid official to look after the many details which are constantly requiring attention. These details, if properly handled, make for the strength and upbuilding of an association, but if neglected cause disaffection and lack of interest in the members and make for dissolution.

The American Pharmaceutical Association has been functioning for more than seventy years in an incomplete and inefficient way, not because of inability or want of interest on the part of its officers, but because it has been handicapped by the lack of the two great advantages just pointed out.

The reorganization plan which was adopted at the Asheville meeting in 1923, provides for the full time official and when the proper individual is found this change will immediately be made by the Board of Directors.

In the meantime a plan had been under way for the collection of a fund for a headquarters building or home. This had been progressing very creditably and encouragingly, but at the meeting of the Board of Directors of the Association, held in Washington last December, there was laid before the body, a plan by which the vision, energy and enthusiasm of one of the members, Mr. H. A. B. Dunning, of Baltimore, could be put to work in a more intensive effort than had hitherto been possible.

The generous offer of Mr. Dunning was accepted, the plans have been perfected and early in April an intensive campaign will begin which will last about ten days and from that time on until the Buffalo meeting of the American Pharmaceutical Association, the work will be systematically continued in the hope

of being able to report complete success at that time as regards the initial object, the collection of $500,000 for a headquarters building and an additional sum of $500,000 for its adequate endowment. The location of the building is to be decided upon by a vote of the entire membership of the Association, after the fund has been collected.

Every pharmacist should contribute to this worthy cause, whether he is a member of the American Pharmaceutical Association or not, and even though the amount given be not large.

If the 50,000 retail pharmacists alone would give but $10 each, the project would be assured, and the contributions from other sources would serve as an endowment to assure the adequate upkeep of such a building. Five hundred thousand dollars for the building and an equal sum for its endowed support is a worthy goal and there are few who doubt that it will be achieved.

Now is the time for pharmacy to show its spirit and prove its worth.

The success of this plan means much to the future of American pharmacy.

All hail its speedy and complete accomplishment.

CHARLES H. LAWALL.

THE DOCTRINE OF SIGNATURES.

The father of homœopathy is credited in a recent issue of a medical journal with having originated the famous doctrine of signatures. Hahnemann indeed was eminently successful in popularizing the old doctrine but centuries before the "Organon" propounded its quaint teachings of *"Similes curantur similibus"* the simple minds of unschooled men had happened upon kindred theories. To that primitive mind it was a foregone conclusion that the earth and all upon and below its surface belonged to man and man alone. It had been fashioned for his particular purpose, to furnish *his* food, *his* fun and *his* physical comfort. Everything on earth was for the service of man and nothing existed that was not so disposed.

That indeed was the philosophy of early days, nor has it been totally discarded even in this day of enlightenment. During these primitive times, the vocabulary was being fashioned and naturally in

his effort to crystallize his budding thought to words, man turned to symbols and figures of speech. Allegory and simile comprised his prime expression. He humanized everything. The sun in the morning sky, birds of the air, the mammoth that plowed the jungle, creeping creatures of the slimy marshes, the flowers that grew untrammeled—everything he humanized. They were the days when every uttered phrase was living poetry. And with us in this material age are evident residues of the vocabulary that was created in the infancy of our race when fancy spoke for fact and poetry for prose. We perpetuate today the imagery of the fathers of our language when we sing of the heart of the rose—the purity of the lily—the grace of the weepng willow—the strength of the great white oak. But the humanization of material things was not all fancy with our fathers of old. Often they sought for more practical comparisons and it was out of this came first the doctrine of signatures. Their creator, in all beneficence, had stamped upon the plants unmistakable marks of indication as to their special value. For if the poppy juice were not intended to silence mental disorders, why was the poppy capsule so like a human head? Why did the aspen leaf quiver in the breezeless air, were this not an indication, a divine suggestion of its use in ague and palsy? States an old writer, "Trefoil defendeth the heart against the noisome vapour of the spleen not alone because the leaf is triangular like the heart of man, but since each leaf contains the perfect icon of a heart and in the proper color of the flesh, the marvellous God's own signature." Yellow turmeric cured yellow jaundice. The red briar rose enriched impoverished blood and blood root cured hemorrhage.

The very names of our myriad herbs and simples echo from this practice of the long gone centuries and perpetuate the queer notions of our quaint ancestors. Birthwort, bladderwort, blessed thistle, boneset, liverwort and heartsease, all hark back to the days when the doctrine of signatures held sway. Even Hippocrates, whose oath good doctors still abide by, stated that diseases were often cured by the use of "like" remedies.

Thus we see that long before Hahnemann founded his school of medical practice, the notion of "like cures like" had run the gamut of the centuries. Nor is it discarded today, for in the vaccine treatment, in the pollen treatment of hay fever and in many phases of our bacteriological and glandular therapy we are only mimicing a very simple doctrine formulated in the unschooled minds of our

fathers of old. The doctrine of signatures indeed is still being practiced, and in many instances quite as empirically as in the days of sympathetic salves and rosicrucian remedies.

IVOR GRIFFITH.

ORIGINAL ARTICLES

THE ROMANCE OF DRUGS.†

By Charles H. LaWall, Ph. M., Phar. D.

Professor of Theory and Practice of Pharmacy, Philadelphia College of Pharmacy and Science.

Part I. Vegetable and Animal Drugs.

OUR FATHERS OF OLD.

Excellent herbs had our fathers of old—
Excellent herbs to ease their pain—
Alexanders and Marigold,
Eyebright, Orris and Elecampane.
Basil, Rocket, Valerian, Rue,
(Almost singing themselves they run)
Vervain, Dittany, Call-me-to-you—
Cowslip, Melilot, Rose of the Sun.
Anything green that grew out of the mould.
Was an excellent herb to our fathers of old.

Wonderful tales had our fathers of old—
Wonderful tales of the herbs and the stars—
The Sun was Lord of the Marigold,
Basil and Rocket belonged to Mars.
Pat as a sum in division it goes—
(Every plant had a star bespoke)—
Who but Venus should govern the Rose?
Who but Jupiter own the Oak?
Simply and gravely the facts are told
In the wonderful books of our fathers of old.

Wonderful little, when all is said,
Wonderful little our fathers knew.
Half of their remedies killed you dead—
Most of their teaching was quite untrue—
"Look at the stars when a patient is ill,
(Dirt has nothing to do with disease),
Bleed and blister as much as you will,
Blister and bleed him as oft as you please."
Whence enormous and manifold
Errors were made by our fathers of old.

†One of a Series of Popular Science Lectures, delivered at the Philadelphia College of Pharmacy and Science, 1923 Season.

Yet when the sickness was sore in the land,
And neither planets nor herbs assuaged,
They took their lives in their lancet-hand
And, oh, what a wonderful war they waged!
Yes, when the crosses were chalked on the door—
Yes, when the terrible dead-cart rolled,
Excellent courage our fathers bore—
Excellent heart had our fathers of old,
None too learned, but nobly bold
Into the fight went our fathers of old.

If it be certain, as Galen says,
And sage Hippocrates holds as much—
"That those afflicted by doubts and dismays
Are mightily helped by a dead man's touch,"
Then, be good to us, stars above!
Then, be good to us, herbs below!
We are afflicted by what we can prove,
We are distracted by what we know.
So—ah, so!
Down from your heaven or up from your mould,
Send us the hearts of our fathers of old.

Songs from Books—Kipling.

When our first rude ancestors, in the dawn of recorded time, found that certain plants or portions of plants could be used in alleviating human suffering or correcting human ills, there was then begun a search for remedial agents or drugs that could be used to cure disease which has resulted in the accumulation of a mass of mostly useless and forgotten lore exceeding that upon any other single subject concerning which man has reduced his thoughts to writing.

What matters it that the word "drug," originally meaning a dry herb, has been enlarged in its significance so that it now includes anything in the animal or mineral kingdoms as well as in the vegetable kingdom? What does it signify that, through the many useless remedies that have had their vogue and then been discontinued after the public has been well supplied, the word has come to be employed in a derogatory sense in the expression "a drug on the market"? What about the sinister modern use of the word in the expressions "drug addict" and "drug habit"? This latter unqualified use is unjustifiable and arouses proper resentment from those who do not wish to see the part confused with the whole, for "narcotic drug" or "dope" is what is really meant in such cases and discredit is cast upon a group of useful substances. How many who use the word "cure" know that in its original employment and

etymology it meant only "to care for" and not of necessity "to relieve"?

If we search these almost forgotten pages of the past we find comedy and tragedy, truth and error, fiction and fact, intermingled in such fragmentary forms as to remind us of the broken pieces of utensils, weapons and other discarded materials unearthed in the kitchen middens of prehistoric civilizations, and the searcher is intrigued by the visions of the past that flash before him like scenes from a screen romance and is stimulated to share the tale with others.

EBERS PAPYRUS.
Wooton's Chronicles of Pharmacy. MacMillan & Co.

Entirely apart from the equally fascinating chapter on magic and the employment of occult practices in medicine, which must be passed over entirely for the present, the searcher finds such a wealth of material spread before him that a subdivision is found necessary; consequently, the first chapter only will be taken up at this time, *i. e.*, the romance of vegetable and animal drugs, leaving for future occasions the equally attractive chapters on the romance of drugs from the mineral kingdom and the romance of medicinal preparations.

Amulets and oracles, witches and warlocks, gnomes and elves, sylphs and salamanders, amber beads, coral necklaces, strings of Job's tears, bags of asafetida and camphor, and the abracadabras of the past must give way for the discussion of the more tangible, yet at times, equally mysterious effects of what mankind has come to call drugs.

We have no direct knowledge of what substances were used as drugs by our troglodytic ancestors who lived in the paleolithic, neolithic or iron ages. Our oldest manuscript on the subject is the Ebers Papyrus,† which dates from 1500 B. C., a time shortly after the bronze age and almost contemporaneous with Moses. In this ancient document more than seven hundred remedies are mentioned, of which but a few are identifiable as now being in use.

Reference is made in this papyrus to an older work on the same subject, which would carry our knowledge of drugs to about 4000 B. C. if the older manuscript were ever to be discovered. Among these remedies which were in use more than 3500 years ago are poppy, castor oil, gentian, aloes, hemp, squill, myrrh, saffron and henbane. Records of ancient India show that there were in use in that country alone more than five hundred drugs, not one of which was of European origin and few of which are now known and used.

The startling thing about the story of drugs is that there is little continuity between the past and present except for a mere handful of medicinal substances that have come down the ages with their reputations unimpaired. Each century, nay, each generation, has had its fads and fancies in drugs and cures, and yet we deceive ourselves if we take pride in our own age being different in this respect from that of the rude, unlettered people of the past, on account of our superior education. As Kipling says:

> "We are distracted by what we believe,
> We are afflicted by what we know,"

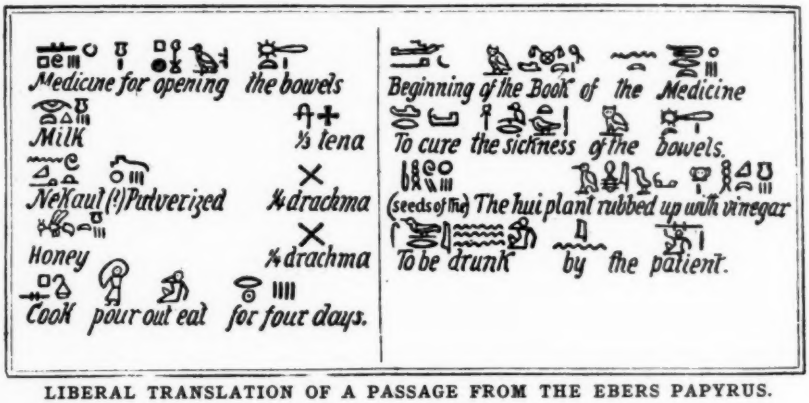
and in respect to drugs and cures we are the victims of cults and "isms" camouflaged by pseudo-science and enveloped in language of mysterious and high sounding unintelligibility, so that our time, with all its scientific advancement will probably be referred to by

†The Edwin Smith Papyrus, recently discovered, is stated to precede the Ebers by about one hundred years.

future generations as the age of credulity. It is a great deal more enjoyable, however, to point out the faults and inconsistencies of others than to deal with our own, so let us go back and wander up some of the bypaths of literature in this fruitful field.

The drugs described by the classical authors of the past are delightfully vague and wonderfully effective. The formulas for Chiron's healing ointments were never divulged. The identity of the anodyne and astringent root with which Patroclus treated Aeneas' frightful wound has never been established. Even the Nepenthes of Homer cannot today be duplicated by modern scientific knowledge. Of its effects we are told in circumstantial detail:

"Whoe'er his wine so medicated drinks, he shall not pour
All day the tears down his wan cheeks, although
His father and his mother both were dead;
Nor even though his brother or his son
Had fallen in battle and before his eyes."



LIBERAL TRANSLATION OF A PASSAGE FROM THE EBERS PAPYRUS.

Guesses as to the identity of this wonderful gloom dispeller have been made by various authorities, and among the drugs mentioned are opium, henbane and Indian hemp, as well as the now discarded mandragora which was so wonderfully esteemed in the early days.

The famed potion of Friar Laurence which caused the counterpart of death in Juliet for two and forty hours has no duplicate in the medicine of our time.

The caduceus or serpent twined about a staff was the symbol of Aesculapius. The serpent has at many periods been selected as

typifying wisdom and in this particular instance the familiarity with which Aesculapius handles the reptile is supposed to convey the idea of his power over its poisonous bite.

Toxicology, or the study of poisons, constituted an important part of the early knowledge concerning drugs. The word "pharmakon" in Greek, now the root word of pharmacy, originally meant a powerful drug or poison. The search for an alexipharmic or universal antidote to all poisons occupied the attention of some of the wisest and greatest of their times.

One of the earliest of these was Mithridates, king of Pontus, who in some of his methods antedated modern scientific procedures in the manufacture of present day biological products, for he fed ducks on toxic principles and used their blood in subsequent attempts to confer immunity from such poisons. He evolved a wonderfully complicated formula for a universal antidote which was called "Theriaca," and which was used for more than a thousand years in various forms and modifications. The esteem in which this preparation was held during this long period was probably due to the tale which originated at the time of Mithridates' defeat by Pompey, to the effect that, finding himself about to fall into the hands of the enemy he attempted to take his own life by swallowing poison. This, however, had no effect, due to his having developed such a high degree of immunity, and he was compelled to command one of his soldiers to kill him to avoid being captured.

It is further stated that the capturing of the formula for Theriaca by Pompey was looked upon as the most valuable fruit of the victory. In medieval times this preparation was so highly regarded that its compounding was carried on as a semi-public function of great importance to the community, and the physicians inspected the ingredients and supervised the preparation of the remedy by pharmacists.

The effect of poisonous herbs upon the lower animals must have been frequently observed by our forefathers, for so many of our herb names carry the terminal syllable "bane," as in cowbane, wolfsbane, dogbane, leopardsbane, henbane, bugbane, and others still in common use.

The Mesopotamian worshippers of Astarte had begun the association of the heavenly bodies with certain earthly substances many centuries before the Christian era. We still retain this thought in our present name of the metal mercury, which is still the name of

the planet as well. It was easy to carry this idea still further and to associate the planetary influences with the action of drugs.

We find Pliny in the first century of the Christian era thus describing the proper method of collecting vervain, then highly esteemed as a remedy, now deemed of little worth:

> "After appropriate libations of honey, the plant is to be gathered at the rising of the dog star, when neither sun nor moon shone, with the left hand only. When thus collected it is said to vanquish fevers and other distempers, acts as an antidote to the bites of serpents, and, when worn, as a charm to conciliate friendship."

THE PREPARATION OF THERIACA.
From Follies of Science. Pharm. Rev. Pub. Co.

We smile indulgently and associate such superstition with the ignorance of that early period, and yet, I personally have been seriously told by a relative of a Pennsylvania German herb doctor that in collecting boneset, if one pulls the leaves off with an upward motion the effect of the drug when taken will be emetic, while if a downward motion is employed to remove the leaves the effect will be cathartic.

The peak of misbelief with regard to occult influences affecting the properties of drugs was in the time of Robert Turner and of Nicholas Culpeper in the seventeenth century. Turner wrote "God

hath imprinted upon the plants, herbs and flowers, as it were in hieroglyphics, the very signature of their virtues." The doctrine of signatures, as this belief came to be called, professed to find resemblances either between the plant and the cause of disease or affliction, as exemplified in the names "feverwort," "boneset," etc., or between the plant and the part of the body affected, as in "liverwort," "heartsease," etc. Many other of our common plant names still reflect this curious superstition. Some of the elaborate applications of this doctrine are amusing in the extreme, as is shown by the following one concerning walnuts, taken from an old herbal:

> "Walnuts have the perfect signature of the head: the outer husk or green covering represents the pericranium or outward skin of the skull, whereon the hair groweth, and, therefore, salt made of those husks or barks are exceedingly good for wounds in the head. The inner woody shell hath the signature of the skull, and the little yellow skin or peel that covereth the kernell is like the thin scarf that envelopes the brain and therefore it is very profitable for the brain and resists poisons, for if the kernell be bruised and moystened with the quintessence of wine and laid upon the crown of the head it comforts the brain and head mightily."

Astrological relationships between plants and stars, as quoted from Pliny's time, had their chief exponent in Nicholas Culpeper, who in the preface to his herbal says:

> "First—consider what planet causeth the disease.
> Second—consider what part of the body is afflicted by the disease.
> Third—consider by what planet the afflicted part of the body is governed.
> Fourthly—You have in this book the herbs for cure appropriated to the several diseases whereby you may strengthen the part of the body by its like, as the brain by herbs of mercury, the breast and liver by herbs of Jupiter, and the heart and vitals by herbs of the sun, etc."

Kipling evidently drew much of the inspiration and information for his "Fathers of Old" from Culpeper, for this curious volume is full of the virtues of "Alexanders and marigolds, eyebright, orris and elecampane," and where Kipling says,

> "Who but Venus should govern the rose
> Who but Jupiter own the oak?"

he quotes almost verbatim, for in Culpeper's book it is said of the rose "damask under Venus," and under the oak "Jupiter owns the tree."

The oldest source of knowledge of Anglo-Saxon plant lore is the "Leech Book" of Bald, dating from the tenth century, in the time of King Alfred, who, it will be remembered, was a better king than a cook. Back in this time the doctrine of signatures had not yet appeared but there was much in the way of incantations

NICHOLAS CULPEPER.

Wooton's Chronicles of Pharmacy. MacMillan & Co.

and rites, both pagan and Christian, as is shown by the following quotation from this ancient manuscript:

> "Against dysentery, a bramble of which both ends are in the earth, take the nether root, delve it up, cut nine chips with the left hand and sing three times the *Miserere mei Deus,* and nine times the *Pater noster;* then take mugwort and everlasting, boil these worts and the chips in milk till they get red, then let the man sip at night fasting a pound dish full, let him rest himself soft and wrap himself warm; if more need be let him do so again, if thou still need do it a third time thou wilt not need oftener."

The Lacnunga, dating also from the tenth century, is another interesting Saxon drug and herb manuscript, which is noticeable for the "vers libre" style in which the virtues of the herbs are proclaimed. The following example is a description of the common herb now known as "Achillea" or "yarrow," once greatly extolled, now held to be of little value:

"Eldest of worts
Thou hast might for three
And against thirty
For venom availest
For flying things
Mighty against loathed ones
That through the land rove."

The ancient Irish Druids, in whom were combined the roles of priest, physician and seer, left an interesting legacy of medical lore concerning both plant and animal products. Manuscripts in the early Irish language have been found, dating from about the same period as the Leech Book of Bald, and containing much the same sort of material. A Celtic manuscript of the fourteenth century contains several recipes of unusual character, for baldness:

"Let calcine a raven, his ashes boil in sheeps' suet, and rub to the head, it cures."

"With mice fill an earthen pipkin, stop the mouth with a lump of clay, and bury it beside a fire, but so as the fire's too great heat reach it not. So let it be for a year, and at the year's end take out whatever may be found therein. But it is urgent that he who shall lift it have a glove on his hand, let at his fingers' ends the hair come sprouting forth."

The advertising claims of modern hair restorers seem modest in comparison with this.

The oldest illustrated manuscript herbal is the Herbarum Apuleii Platonici, of which the Saxon edition of the tenth century is a translation of a Latin work of the fifth century, of which the original has never been discovered.

Of the printed herbals, the most noteworthy books on drugs of the sixteenth and seventeenth centuries, there were a great number and variety. Turner's (1551), and Culpeper's (1652) have already been mentioned. Others of importance were: Bancke (1525), Carey (1550), Treveris (1526), Gerard (1597), Parkinson (1629),

Cole (1656), Salmon (1710), and Tournefort (1716). These were all printed in English.

Of the herbals in other languages, of which quite a number are known, the most famous is that of Monardes (1659). Monardes was a Spanish botanist and explorer who contributed the first herbal of the New World. His work contains the earliest published account of the use of tobacco by the Indians and the first accurate description of the plant itself.

MATERIA MEDICA OF THE FIFTEENTH CENTURY.

From Follies of Science. Pharm. Review Pub. Co.

The sixteenth and seventeenth centuries, too, saw the beginning of many of the great botanical gardens of the world, some of which are still in existence. The following cities are on the honor roll in this respect, the accompanying figure being that of the year in which the garden was instituted in each case: Padua (1533), Florence (1544), Bologna (1547), Paris (1570), Montpelier (1598), Jena (1628), Oxford (1632), Upsala (1637), Chelsea (1673), Edinburgh (1675), Leyden (1677), Amsterdam (1682), and Utrecht (1725).

The first botanical garden in the new world was established privately in Philadelphia in the eighteenth century by John Bartram.

These centuries following after the discovery of America were the days when sick cattle or humans were often reputed and believed to be "elf shot," and much of the efficacy of drugs was directed to the cure of such afflictions. As Kipling says of some of these early authors, again to quote from "Our Fathers of Old,"

"Most of their teaching was quite untrue,"

but there are those today who would still hold with the author of Treveris' "Grete Herball" in 1529, that:

> "It is impossible for them that drynketh overmuche water in theyre youth to come to ye age that God hath orderyed them."

DEMONS OF DISEASE OF FIFTEENTH CENTURY.
Peters' Pictorial History of Pharmacy. G. P. Englehardt & Co.

The majority of the highly esteemed herbs and medicines in any country were of local origin, but rare and valuable products of the Orient had found their way into medical practice, and in the twelfth and thirteenth centuries we find drugs vieing with spices as important objects of commerce in Venice, that remarkable republic, which could truly boast that for a thousand years she had never been bankrupt, never paid tribute to a foreign prince, nor been occupied by a foreign army, although she was denounced by her rivals as a mercenary nation of shopkeepers.

Marco Polo had brought back from his travels accounts of camphor and of Turkey rhubarb, then worth their weight in gold. Ambergris, musk, sandalwood, storax, galangal, spikenard, saffron, benzoin, frankincense, scammony, aloes, manna, galbanum, asafe-

tida, myrrh, opium and opoponax, some of them drugs and others valued ingredients in incense, are all mentioned in merchandise lists of fourteenth century Venetian commerce.

In the sixteenth century the population of Venice was equal to that of London. The Portuguese and Spaniards had by this time, by their discoveries of the two great all-sea routes to the Indies, acquired a monopoly of the traffic in spices and drugs, and two or three voyages each with a tenfold return of the investment would bring wealth to those who risked the perils of such adventure, or who could engage others to do so in their stead.

> "All to stuff the sunset in our old black galleon
> All to seek the merchandise that no man ever found."

was the impelling force of much early exploration and conquest.

The Muscovy Company and the Levant Company of England were examples of organized effort to offset the then growing domination of the eastern trade by Holland. This was the period when Drake's flagship returned from the successful circumnavigation of the globe:

> "A little weed clogged ship
> Grey as a ghost glided into the sound
> And anchored, scarce a soul to see her come
> And not an eye to read the faded scroll
> Around her battered prow—The Golden Hind."

What stirring deeds are recalled by the sound of the names with which the doughty mariners christened the ships that charted the seas that safely carry our commerce of today—Bonaventure, Malice Scourge, Ascension, Red Dragon—all are reminiscent of the dauntless acts of times when the bravest men who ever lived sailed the then uncharted seven seas in search of gold and glory, and brought back to Europe drugs of mystery and renown.

The school of medicine at Alexandria had, centuries before, established principles called the "Tripod of Medicine," which should govern the treatment of disease. Observation, history and analogy are sound factors even in our time, but, through the many years during which the literature had accumulated, much of the observation was incorrect, the history fabulous, and the analogy untrustworthy. Even today these factors are not always reliable. Small wonder is it then, that in the byways which we shall now search out

we shall find ourselves, at times, in the therapeutic graveyards of the past.

It is impossible to do more than discuss very briefly a few of the drugs of prominence or interest in the time that is at our disposal. A few from the old world, including some that have come down from the time of the Pharaohs and their contemporaries, and a few from the new world that have either found a permanent place in modern medicine or are noteworthy for some other reason.

Aloes. It is doubtful whether the aloes of the Papyrus Ebers is the same drug that is meant in our own time. It is certain that the aloes of the Bible is not the same, for what is meant there is a wood used for incense and sharing only the property of bitterness with the genuine drug, which is the solidified juice obtained by evaporation of the sap of the leaves of a plant resembling our well-known century plant. The real aloes is not mentioned either by Hippocrates or Theophrastus, who were early writers on drug subjects.

Dioscorides, in the fourth century, B. C., describes it and states the dosage to be one drachm for a gentle purge and three drachms for full cathartic effect. The modern dose is less than one-tenth of that amount. Celsus, called the Cicero of physicians by later historians, states in the first century of the Christian Era, that "Aloes is valuable for city men, and men of letters," recognizing the common affliction of the sedentary at that early period. It is an ingredient of the oldest compound remedy which is still in use unchanged, a mixture of aloes and an aromatic bark called "canella," although the meaning of the name "Hiera Picra" (literally "Sacred Bitters"), has long since lost its significance.

Aloes originally came from an island Socotra (Sokotra), lying southeast of the Gulf of Aden. The name of the island is said to be derived from the Latin *Succus citrinus*, meaning yellow juice, in recognition of its principal product. Aloes was so highly esteemed as a drug in Alexander's time that when he returned from his conquest of Persia and India, he came by way of Socotra, removed the original inhabitants, and replaced them by a Greek colony intended to ensure a sufficient supply of the drug for future years. This was done upon the advice of no less a person than Aristotle, the philosopher. It is stated that these Greeks later became an important Christian colony. In the seventeenth century the entire trade in aloes was controlled by the British East India

Company, who dealt directly with the King of Socotra and usually purchased the entire stock. The plant had been introduced into Europe as an ornamental garden plant and was known by the name of "Sempervivum." The island is now owned by Great Britain and is still the source of the widely-known and important variety of aloes known as Socotrine aloes.

The Arabians carried the fame of aloes down to the middle ages and it was one of the drugs recommended to Alfred the Great by the Patriarch of Jerusalem in the tenth century and is mentioned in the Leech Book of Bald. In the eighteenth century a West Indian variety known as Barbadoes aloes appeared (now obtained from Curacoa and usually known by that name at present), and a South African variety known as Cape aloes, appeared in the world's commerce. All of these varieties are now used in medicine.

Among the curious errors which existed with respect to this drug, it is stated by an early author (Pomet, 1701), that when the flowers open they make a great noise like the report of a gun. Through these many centuries aloes has continued to hold a prime place in medicine and is employed in more than twenty official preparations at the present time in the United States Pharmacopœia and National Formulary.

Opium. One of the most useful of drugs and at the same time one which, when misused, is a terrible master; one of the mysterious drugs of the remote past over which wars have been fought almost in our own time. It is the dried juice of the unripe poppy capsule, that name which brings visions of the scarlet flowers of Flanders fields, although as a matter of fact, the opium poppy has a pink or purplish-pink flower of much larger size than the red poppy.

The word "opium" means simply "juice." Formerly known as Opium Thebaicum, the latter name alone came to be used for centuries as a synonym of the drug. The ancients of Theophrastus' time described a variety known as "meconium," which was made from the juice of the crushed plant and was much inferior in narcotic quality to that obtained from the capsules. Probably other drugs were known by the same name, for the opium of Hippocrates was described as having purgative properties which the real opium does not possess. Dioscorides describes the opium which we know and also discusses its adulterants.

Galen rarely used opium as such but speaks highly of "Theriaca," which owed its principal value to opium. Paracelsus, noted

as the originator of laudanum, owed much of his fame to his boldness in the use of this drug. Van Helmont employed it so frequently that his contemporaries called him "Doctor Opiatus." Sydenham said, "Among the remedies which it has pleased Almighty God to give to man to relieve his sufferings, none is so universal and so efficacious as opium." One of King Manuel's Portuguese agents in the Orient speaks of it in a letter in 1516 as "A great article of merchandise," and that "Kings and lords eat of it." In former times, the Sultans of Egypt had sent presents of opium and Theriaca to the Doges of Venice and the sovereigns of Cyprus. There was long a tradition of a white variety of opium which the Turks are said to have kept for themselves.

The Arabians were the greatest users of opium until the eighteenth century, some authorities stating that the prohibition of wine by Mohammed was the impelling cause of the general use by the Arabs of such narcotics as opium and "hashish."

The Chinese never saw opium until the ninth century, when it was taken there by the Moors for use in dysentery, the prevalent disease among a people so careless in the use of fertilizers and of the purity of their drinking water. The smoking of opium in China did not begin until late in the seventeenth century. Within 100 years it had undermined the morality of the people and was recognized as a plague. The importations of opium by the Chinese were small until 1787, when the British East India Company, seeing an increase in the trade, established supply depots in Larks Bay south of Macao, an island adjacent to Hong Kong. This so stimulated the use of opium for smoking, as well as for medicinal purposes, that the Chinese Government was compelled to take action, and the first edict against the practice was issued in 1796. The Chinese authorities complained of these ships putting in at Larks Bay, saw the growing peril of the use of narcotics by the people, and in 1820 forbade any vessel containing opium to enter the ports of Canton, a short distance north. This led to contraband trade between the East India Company and Chinese officials, and eventually, in 1840, to the struggle between Great Britain and China, known as the "Opium War," which culminated in the treaty of Nanking in 1842, by which five Chinese ports were opened to foreign trade and opium was declared a legal article of commerce. Seldom in history has the weakness and need of a nation been exploited so disgracefully as has been the case with opium in China and it is a shameful page

in the history of the Island Empire upon whose possessions "the sun never sets."

Another interesting chapter in the history of opium is that in which Derosne and Serturner, two apothecaries working independently, one in France and the other in Germany, in the early years of the nineteenth century, opened up the great period of plant chemistry by the discovery of the narcotic principle of opium, named "Morphium" by Serturner, after Morpheus the God of Dreams. In our day and times this narcotic drug and all of its preparations and derivations are under strict Governmental and State supervision for the protection of the people.

Camphor. A drug derived by distillation from the wood of certain Eastern trees, camphor, or camphire, as it was frequently spelled, was one of the most costly products imported by the Venetians, who maintained a monopoly of it for centuries. It does not appear to have been known to the ancient Greeks and Romans, nor even to the Chinese until after the sixth century, although the world's principal supply now comes from Formosa. Early travelers brought back erroneous tales of its flowing from trees as a white gum which solidified at the foot of the trees in little cakes. In Burton's "Arabian Nights" he speaks of the Lord of the Land of Camphor, and Marco Polo tells of its selling for its weight in gold. There was great confusion in early times regarding camphor because of the fact that it was obtained from two very dissimilar trees growing in different lands.

The laurel camphor, now the principal source, is cultivated in China, Japan and Formosa, and also in Florida. The Borneo camphor, as the other variety was called, came from the Malay States, usually through India. In 1350 the Great Khan of China sent an embassy from Pekin to Pope Benedict XII, with gifts of silk, gems, camphor, musk and spices. The Arabs were great users of the drug and often added it as an ingredient to their cooling drinks. At present it is used as a moth repellant as well as in medicine. The quantity of some drugs purchasable for a certain amount of money, was of importance, according to one medical superstition. When a person purchased camphor to put in a bag to wear suspended from a cord encircling the neck to keep away disease, it was necessary to purchase ninepence worth, in order to have any efficacy.

In our time it has been found possible to make camphor synthetically, for the needs of the civilized world for moving pictures is associated with celluloid, and celluloid is a combination of ingredients in which camphor is an important factor. It is a far cry from Marco Polo to Charlie Chaplin, but camphor bridges the gap successfully.

Indian Hemp. Cannabis Indica, Bhang, Siddhi, Guaza, Marihuana, Gunjah or Ganjah, Churras, Majoon, probably better known to many as "hashish," from which our word "assassin" is derived, according to some etymologists, is another drug which was not known to the ancient Greeks or Romans, unless it was an ingredient in Nepenthes. It is a product of the common hemp plant, whose fibres are used for rope and the seeds of which are used as food for birds and the oil as an edible oil as well as having uses in the arts.

The female plant secretes a resin at the time of inflorescence, and it is the massed flowering tops collected before the seeds are matured that constitutes the drug as used in commerce and medicine. It was once believed that only the Oriental plant was physiologically active but the domestic product is now recognized as of equal value with the imported. It is a native of Persia, later introduced into India, where it has been cultivated for many centuries. It plays an important part in Oriental literature and is frequently mentioned in the "Arabian Nights." In one of these references King Omar casts the Princess Aboriza into heavy slumber with a piece of "bhang," so concentrated that if an elephant smelt it he would sleep for a year.

Indian hemp as a habit-forming drug does not seem to appeal to races of the Occident. Medical writers have frequently called attention to the fact that the astonishing effects produced by its use in India are not capable of duplication in cooler climates. Of the Arabian "hasheesh" eater it is said that "it seemeth to him that the world is in the hollow of his hand." The Arabian poets speak frequently of the emerald cup, referring to the brilliant green color of the best quality of the drug and the preparations thereof. In India it has been called "Indrasana" or Indian hemp.

The use of this drug is very carefully controlled in this country and is subject to Federal regulation as regards declaration of its presence in medicines sold to the public. The growing of the plant is forbidden in some western States on account of the illicit

and dangerous use of the drug when mixed with tobacco and made into cigarettes, such cigarettes bringing from ten to fifteen cents apiece in the underworld, where they are in demand.

Rhubarb. This dried root of a plant related to our garden rhubarb is undoubtedly one of the oldest of the drugs whose history has come down to us uninterruptedly from the remotest past. Originating in China and known there before Cheops had erected the great pyramid at Gizeh, it takes its name from the classic appellation of the River Volga, then called "Rha," the contact point where this product of the Eastern world was delivered to the people of the West. The Rha Ponticum or domestic variety of the drug was considered inferior to the Rha Barbarum, or foreign variety.

Rhubarb was sent from China through Mongolia to Bokhara, thence either by caravan to the Black Sea (Mare Ponticum), or by water route down the Indus and through the Persian Gulf to Arabia. Later, as different trade routes developed, there came to be known three kinds of rhubarb, all of which started from the same country of origin but were named from the place of distribution.

Russian rhubarb was transported over the barren steppes of Central Asia through Turkestan and over the Caspian Sea to Southern Russia. This rhubarb was inspected, selected, and restricted at various distribution points like Moscow and St. Petersburg.

Turkey rhubarb came overland to Bokhara and then down the Indus or the Persian Gulf to the Red Sea and then through Asia Minor to Turkey.

Chinese rhubarb was shipped direct to Europe from Canton, the only Chinese port open to European commerce prior to the Opium War Treaty in 1842.

The risk and enormous expense of overland transport made rhubarb one of the rarest drugs of ancient times. Twelve times as expensive as benzoin, four times as valuable as saffron, twice as costly as opium, it was a drug fit for the use of royalty. In our time it costs less than a dollar a pound and nobody remembers or cares about its history. Its present popularity is attested by the fact that twenty-six preparations of rhubarb are officially recognized in the United States Pharmacopœia and National Formulary.

Senna. This leaf drug is associated with the early medical

practice of India, Assyria, Egypt and Phoenecia. Found in the tombs of the Pharaohs, it has been a popular home remedy from that period down to the present. It was introduced into European medical practice by the Arabs in the ninth or tenth century. One variety was collected wild in the Sudan and later cultivated in that and other parts of Egypt, and is known from its port of shipment as Alexandrian senna. The other variety is cultivated in the Tinnevelly district of India from a wild Arabian species. Although only introduced into India less than 200 years ago, over 25,000 acres are devoted to the cultivation of what is now called Tinnevelly or India senna. In the sixteenth century some was cultivated in southern France and Italy, but this has long since been discontinued.

Senna is used by physicians and is also a popular home remedy. By far the greater use of senna, however, is in the field of patent medicines, where thousands of pounds are used annually for each pound used otherwise.

Castor Oil. The small boy's bane, according to the comic papers, this medicinal oil, which dates back to our earliest historic periods, helped win the World War, for it was found to be indispensable in airplane lubrication, and in order to obtain supplies before the knowledge of its need would send prices skyrocketing, the detailing and selling organization of one of our large American drug manufacturing houses was secretly put to work, so effectively, that on a certain day excess stocks were simultaneously purchased in every part of the United States and the supply thus assured.

The plant was known to the ancient Romans as "Palma Christi," in allusion to the shape of the leaves. It is a native of India. Herodotus refers to it as "Ki Ki." The word translated "gourd" in the legend of Jonah is believed to refer to the castor oil plant, which is a much more reasonable interpretation of the occurrence therein related. Theophrastus called the seeds "Kroton," from their resemblance to the dogtick of that name. The seeds have been found in Egyptian sarcophagi. It was the seeds and not the oil which were popularly known in European medicine until the eighteenth century. The name "castor oil" was given to it in the erroneous belief that it was derived from the seeds of a West India plant named Angus Castus.

This plant is often grown for ornamental purposes and more or less successful attempts were made to cultivate it commercially

in the Southern States during the World War, but our present supplies come almost entirely from India, its original home, where, according to De Candolle, it has been cultivated for more than 4000 years or since before the time when the inhabitants of the land of Shinar built the famous tower of Babel.

The new world has given much of value to mankind, both in foodstuffs and in drugs. By far the most important of the latter is the drug from which quinine is obtained, which is cinchona.

Cinchona is the bark of a small tree originally growing on the slopes of the South American Andes. To do full justice to this drug we should have to devote an entire evening to it alone. It is possible only to point to some outstanding facts.

Contrary to the history of most drugs, we find no certain evidence that cinchona bark was ever used as a medicine by the South American natives prior to the advent of their white conquerors, and the traditions concerning it are few. Even the Peruvian native doctors of today do not employ it and the Indians themselves are antagonistic toward its use.

Peru was discovered in 1513. No mention of this wonderful bark was made for more than 100 years. In 1638 the wife of Count Chinchon, Viceroy of Peru, was cured of a stubborn intermittent fever by the use of the bark of a native tree. Its virtues were so quickly extolled that within two years it had been introduced into Spain and a few years thereafter into the rest of Europe. Being largely distributed by the members of the Society of Jesus it came to be called "Jesuits' Bark" and "Jesuits' Powder," "Powder of the Cardinal" and "Powder of the Fathers." It was also called "Polvo de Condesa (The Countess's Powder)," "Peruvian Bark," "Peruvian Powder," "Fever Bark" and similar names of obvious origin. When Linnaeus later came to classify it and name the plant, he made an error in spelling the name of the Countess of Chinchon, and it has been known as Cinchona ever since.

It was first introduced as a nostrum, advertised in the newspapers of the day as a cure for fever. It was said of its early history that "only laymen, charlatans and semiprofessional empiricists" were willing to use it. Protestants refused to employ it because of its association with the Jesuits and its name. At first it was worth almost its weight in gold, for even when used empirically in certain kinds of fevers its curative effects were marvellous. The greatest handicap to its use lay in the fact that it upset all schools of medi-

cine of that period which were based upon humors or fluxes. Some physicians preferred to die rather than use remedies so opposed to principles of the then existing practice. It was the beginning of the end of Galenism which had held undisputed sway for more than 1500 years. Many physicians of that day would not use a drug not known nor prescribed by Galen. Ralph Irving, a writer on the subject, in 1785 said of cinchona:

> "There are interwoven the story of commercial greed and the efforts of the self-sacrificing pioneer, antagonisms of religious sects and rivalries of nations, distractions bred by medical ethics and personal hatred within professional ranks."

Sydenham and Huxham, both eminent English physicians of their day threw off the shackles of prejudice and used the drug with great success. We still have in the Pharmacopœia today a preparation of cinchona bark known as Huxham's Tincture, devised in 1755. Torti, an Italian physician of recognized standing, not only introduced it into the medical practice of his country, but in connection with its use for ague coined the word "mal-aria" literally, "bad air," for that disease now known to be due to a blood parasite introduced by the sting of the mosquito, was associated with the exhalations of marshes.

Talbor, a charlatan in English medical practice, attained great fame by curing first the daughter of a peer and later Charles II, who knighted him and appointed him royal physician at 100 pounds a year. Talbor then went to Paris and cured the Dauphin, son of Louis XIV. For this service he received 2000 guineas, a pension of 100 pounds a year and the title "Chevalier." He then went to Spain, where he cured the queen (malaria seeming to be a prevalent disease of the nobility of that time), after which he returned to London and died in 1781 at the early age of forty.

The drug of this period had begun to be highly adulterated and attempts were made as early as 1743 to transport plants to Europe with the view to establishing its cultivation in other parts of the world. La Condamine made the first attempt and lost his whole cargo in a heavy sea at the mouth of the Amazon River. Other attempts were unsuccessfully made by the English and the Dutch. About the middle of the nineteenth century a traveler named Ledger obtained some seeds in Bolivia, part of which he sold to the Dutch Government for the ridiculously low price of £33,

with the agreement of a further payment if the seeds grew. In the first year the Dutch succeeded in raising 20,000 plants from this lot of seeds and paid Ledger an additional sum of £100. From this nucleus the Dutch started the cinchona plantations of Java, which now dominate the world's supply.

In 1895 Ledger was found living in poverty in New South Wales and after two years of argument the Dutch were induced to give him a beggarly annuity of £100, although the income of their plantations ran into the millions.

The Indian Government, which had also established successful plantations with seed procured from Ledger for nothing, refused in 1895 to give him anything in his evident time of need.

In 1812 Gomez, a Lisbon chemist, had prepared a concentrated preparation of the bark, which was in reality a crude form of quinine, which he called "cinchonino." In 1820, Pelletier and Caventou, the pair of French apothecaries who did so much for the plant chemistry of those early days, proved the basic properties of the active principles and separated and manufactured for use, quinine and cinchonine. In the meantime, another French chemist named Seguin, had made himself a laughing stock for all time in the scientific world by asserting that the active principle of cinchona bark was gelatin, basing his claim on the misleading fact that both gelatin and quinine are precipitated by tannin.

It remained for Perkin to add the last fantastic chapter to this individual romance, for it was his unsuccessful effort, in 1856, to prepare quinine synthetically that led to the discovery of the first coal tar color, and this unlocked the secrets of the tar barrel with its yet increasing avalanche of synthetic products.

Coca. This leaf drug must not be confused with Cacao, from the seeds of which chocolate and cocoa are prepared, nor with Coco, which yields coir, copra and the shredded delectable used in confectionery and desserts. Coca is the source of the habit-forming alkaloid cocaine. It and its products and derivatives are under the same rigid restrictions as is opium, previously discussed. Unlike cinchona, although coming from the same part of South America. its history and tradition go back to the earliest records of that proud and mighty race known as the Incas, where it played an important part in the political and religious life of that people. It is still called the "Divine Plant of the Incas."

Pizarro's invasion of Peru brought the first knowledge of this drug to the white race. It is used as a masticatory in South America as betel is used in the Orient, differing from the latter, however, in that betel has very little physiological effect, while coca is a powerful stimulant. Early commentators seemed not to have appreciated the medicinal or stimulating properties of the drug, for they speak of the curious custom of the natives of carrying a small leaf in the mouth while traveling. Even Humboldt confounded the properties of the coca leaf with the ashes usually mixed with it before chewing, evidently confusing it with clay eating customs which he had observed. Dr. Abraham Cowley in 1662 said of it in regard to its sustaining qualities as used by the natives,

> "Each leaf is fruit, and such substantial fare
> No fruit beside to rival it will dare."

The drug was introduced into Europe in 1565, and so little were its effects understood, using it simply as a drug and not in concentrated form of the active principle, cocaine (which was not discovered until late in the eighteenth century), that Joseph D'Acosta, a Jesuit missionary, described it as "a delicate and royal leaf," and Markham observed that "of all narcotics used by man coca is the least injurious and the most soothing and invigorating."

Toward the close of the eighteenth century it was the basis of a well-known nostrum prepared by a French physician named Mariani, who had a coca garden growing in connection with his establishment. So great was the success of the preparation that Pope Leo XIII sent to Mariani a gold medal as an expression of his ecclesiastic approval of it.

It is extremely probable, that had the local anæsthetic effects of cocaine, the active principle of the drug, not been discovered, the drug itself would now be an esteemed and useful article of the materia medica instead of being tabooed, as it is. The habit producing effect of cocaine and its widespread illicit use has brought discredit upon a drug which, when properly employed, was found to be very useful.

Ipecac. The root of a Brazilian vine brought to France in 1672 by a physician named LeGras, ipecac created nearly as much of a furore in its time as did cinchona. It is said that the name is derived from a native word "pigaya," and that it was first used by a Portuguese friar in the treatment of dysentery. Several accounts

exist as to the way in which a semi-quack named Helvetius learned of its properties.

One account states that an apothecary named Clanquelle kept the stock of the root which LeGras imported and that Helvetius, a friend of the apothecary, obtained his supplies in this way. Another version says that a merchant by the name of Garnier imported 150 pounds which he brought to the attention of his physician, Afforty, who paid little heed to its possibilities, but that his assistant, Helvetius, learned to use it with success. At any rate, the tale continues that LeGras gave too large doses of the drug and damaged its reputation among physicians, but that Helvetius used it as a secret remedy and made many remarkable cures of patients suffering from dysentery. His professional success being called to the attention of Louis XIV, whose son, the Dauphin, had been cured of a serious dysentery (the Dauphin seems to have been a proving ground for new world drugs), that generous monarch paid $4000 to Helvetius for the secret of the cure. The formula for the cure proved to be a complex mixture of drugs, of which only one ingredient, called by Helvetius "Radix Antidysenterica," and identified as ipecac, was proved to be effective. Helvetius was sued by Garnier, who claimed a share of the reward, but the courts decided in favor of Helvetius.

For a time ipecac was also called Brazil Root and was very scarce and shrouded in much mystery as to its origin and identity. This confusion led to a mistake by Linnaeus, the eminent Swedish botanist, who in 1764 erroneously described and named the wrong plant as the source of this drug. In our own time ipecac has had quite a vogue as a reputed remedy for pyorrhea.

Sarsaparilla. This is the root of a climbing vine of the Smilax family, growing in Mexico and Central America. It was described by Monardes and was at first called "Zarza-parilla" and later "Salsaparilla." Some people even today can neither spell nor pronounce the word but say something that sounds like "Sassafrilla."

Sarsaparilla was vaunted as a remedy for blood diseases, especially syphilis. The reputed effect was mainly due to the sudorific property of the large volumes of the infusion that were directed to be drunk and also to the presence of really active drugs such as guaiac or mezereum which were added to its compounded preparations. As a matter of fact and recorded scientific observation, sar-

saparilla has little or no real activity or virtue, and as if to add insult to injury it will probably shock a number of persons to learn that sarsaparilla has no flavor. That is to say, no pleasant flavor, for the infusion has a mawkish, sickening taste of no particular distinctiveness. What then *is* the flavor so popularly known as sarsaparilla? Sh! Let me tell you a secret. It is a mixture of our old standby flavors—wintergreen and sassafras. "Well," you say, "what about the wonderful blood purifying medicines, the 'Sarsaparillas' that blazoned forth from billboards and newspapers, to say nothing of the almanacs about thirty or forty years ago?" Another secret is about to be disclosed. Any virtue which these preparations possess is in all probability due to the potassium iodide which all of them contain and which does have what is called "alterative" effects. One early medical writer of the eighteenth century came pretty near to telling the truth when he said "Sarsaparilla is fitter for lighting fires than for use in physick."

Guaiacum. This is the wood of a West Indian tree, much employed in medicine at one time and now little used, not because of its inertness but because of its irritating qualities and because better remedies have been found for the same purpose. It was first brought from Santo Domingo, and Guayacam was its original native name.

It was used in syphilis and in rheumatic affections. The Canon of Merton Abbey, in 1536, extolled its virtues in the following manner:

> "The wood called Guaiacum that healeth the French Pockes and also helpeth the goute in the feete, the stone, the palsy, dropsy, falling evyll and other dyseases."

It was so highly thought of by some that they called it "Lignum Sanctum" or "holy wood." Many know it better by its common name of Lignum Vitæ, for it is the heavy and resinous wood used for knife handles, bowling balls, rolling pins, mortars and pestles, and other turners' ware. It is the shavings, raspings and chips, the by-products of its modern industrial uses that now supply the demand for the small amount of this drug that is still used in medicine.

Let us now go up another by-path and consider some of the unusual drugs of the past.

The Unguentum Amarum and the Sympathetic Powder of Kenelm Digby, both of the seventeenth century, were illustrations of the vicarious effect of drugs in treating wounds. In both of these products, which were recommended principally for wounds made by swords or spears, the remedies were not applied to the wound, but to the weapon which caused it, if it could be located, or failing that, a bloody garment which had been removed from the victim. The interesting feature of this treatment consisted in the fact that the wound was simply to be cleaned with water, bound up tightly with a clean piece of linen and not to be unbound for at least a week. This crude application of what we now know are principals of asepsis, together with the tendency of many such wounds to heal by first intent, as it is called, probably increased the percentage of cures by this method to a point where the absent treatment really appeared to have merit.

The mandrake of early times was the root of a plant growing abundantly in Greece and other Mediterranean countries. It is entirely distinct from the drug known by that name today, which is the underground portion of the Mayapple plant. It was believed to have magical properties, even so far back as the time of Homer. It was also called "Planta Semi-hominis" or "half-man plant," on account of the bifurcated appearance of the root. It was believed to exist in two forms—male and female. The soporific properties which are credited to this drug have made it a favorite among classical authors. Shakespeare makes Iago say:

> "Not poppy, nor mandragora,
> Nor all the drowsy syrups of the world,
> Shall ever medicine thee to that sweet sleep
> Which thou owedst yesterday."

In Genesis, the Bible says Reuben gathered mandrake and his mother Leah bribed Rachel with them to permit her to enjoy Jacob's affection, and for centuries it was used in love philters. It is only fair to say that the rendering of this term has been questioned by some Biblical authorities.

The price of the root was high because it was believed that the best variety could be collected only under the gallows of one who was legally hanged, and when dug at midnight, as was required, the collector must needs stop his ears with wax to keep him from hearing the terrible shrieks of the root as it was torn from the earth, the hearing of which might strike him dead. As an

additional precaution against hearing the collector often blew a horn.

In "Romeo and Juliet" Shakespeare alludes to this:

> "And shrieks like mandrakes torn out of the earth,
> That living mortals hearing them run mad."

Pliny speaks of the dangers associated with the collection of this drug and says: "Whoever would dig it must avoid having the wind against him and when he digs should face in the direction of the setting sun."

The soporific effect is also referred to by Cleopatra, when desiring to sleep away the time during Antony's absence, she says: "Give me to drink mandragora."

COLLECTING MANDRAKES, FIFTEENTH CENTURY.

Peters' Pictorial History of Pharmacy. G. P. Englehardt & Co.

It is related of Hannibal that fighting a large army of African rebels, he simulated retreat, but left on the battlefield a large number of vases of wine in which mandragora had been infused. The savages having drunk the wine, were stupefied and fell an easy prey to Hannibal's troops upon their return at the proper time. It is strange, indeed, that a drug whose properties were so circumstantially described by ancient writers as possessing such marvelous soporific effects should have so little real value that in our own time it is not even recognized in the pharmacopœias of European

countries where the plant still grows. It makes us wonder how much of the ancient writings is worthy of credence.

The animal drugs of former medical practice were for the most part so revolting in character that a frank discussion of them is inadvisable. Their general character was referred to by the eminent satirist, Dean Swift, in "Gulliver's Travels," where in describing his experiences among the Houynhmns, he speaks of medicines from "herbs, minerals, gums, oils, shells, salts, juices, seaweed, excrements, serpents, toads, frogs, spiders, dead men's flesh and bones, birds, beasts and fishes."

The early London Pharmacopœia included more than two hundred separate substances of animal origin, most of them exceedingly disagreeable in character. Mummy, or dried human flesh, originally obtained from the Egyptian sarcophagi, was later permitted of domestic origin, the requirement being that the flesh should be that of a young, red-haired man who had died a violent death. Human fat was used until nearly the end of the eighteenth century, and was sold as low as fifty cents an ounce. One authority complained that the business of the apothecaries was seriously hampered "as everybody knows in Paris the Publick Executioner sells it to those that want it, so that the Druggists and Apothecaries sell very little of it, although they vend a sort that is prepared with aromatical herbs, and which is without comparison much better than that which comes from the hands of the Hangman."

Even in Pepy's time live pigeons were cut in half and applied to the feet of patients suffering from the gout, the Queen of Charles II being one of the notable cases thus treated. Snails for cough syrups and earthworms for lung complaints were among the least objectionable of internal remedies. Lice and bugs were also esteemed greatly. It has remained for a comparatively modern work, however, to furnish the most amusing incident in connection with animal drugs of this character. Homœopathic pharmacopœias, as late as forty years ago, carried a list of many animal drugs of unpleasant character. In an edition of *The American Homœopathic Pharmacopœia of 1895* it is stated, under Cimex Lectularius (the entomologic name for bedbugs), "This insect is too well known to require a description." This I consider a gratuitous insult to every homœopathic physician and pharmacist.

Bezoar stones were among the more curious animal remedies. The bezoar is a semi-mineral concretion found in the intestinal tract

of herbivorous animals. The better sorts of bezoar came from the Persian wild goat. There was an Oriental bezoar of the above origin and an Occidental bezoar from local animals. These bezoar stones, as they were frequently called, were often counterfeited, and upon one occasion the Lord Mayor of London called upon the courts to conduct an investigation as to the character of certain questionable bezoar stones. A genuine stone of about four ounces weight was known to have brought over $300. Admiral Lancaster, the commander of one of the early British spice squadrons brought, as a gift for Queen Elizabeth from one of the Oriental potentates, a genuine bezoar of great value, which Elizabeth never used as she died before Lancaster arrived.

Vipers' flesh and vipers' fat were also of importance as being one of the indispensable ingredients in genuine Theriaca, and wine of vipers' was a popular tonic.

The unicorn was still authoritatively described by so-called naturalists and drug authorities in the eighteenth century. The horn was the portion employed. Later investigators discovered that what was sold for and believed to be the horn of the unicorn was in reality the horn of the narwhal, a mammal of the northern seas.

The phoenix and the dragon were also referred to confidently by early medical authors as sources of remedial power. The drug known as "dragon's blood" is still used under that name in the East, but it is a bright red-colored resin and is now used in violin varnish.

Contrast these numerous and disgusting crude animal products with the few drugs of animal origin today, numbering less than a score and including lard, woolfat, suet, beeswax, cochineal, cantharides, gelatin, oxgall, cod liver oil, egg, milk, beef extract, the enzymes, pepsin, rennin and pancreatin, and a few glandular products. The animal drug therapy of today is largely concerned with the vaccines and sera, the products of a scientific development of biological chemistry, as far removed from the crude empiricism of the past as it is possible to imagine.

Probably the only animal drug of real interest and also of value that has come down to us, not only unimpaired but even strengthened in reputation by the researches of science, is cod liver oil. The empiric use of this product, crude though it was in olden times, set it apart from other animal oils as of peculiar value in what are commonly called the wasting diseases. As time went on

and science attempted to explain the cause of this difference from other oils, first one and then another reason was given. Compounds of iodine and bromine were at first believed to be present in appreciable amounts. When this was proved not to be the case, the search began for basic active principles and the so-called alkaloids or concentrated products derived from the oil made their appearance. These were found to be mainly decomposition products resembling ptomaines, present in amounts varying inversely with the purity of the oil, and still the pure oil held its vogue because it produced therapeutic results.

PREPARATION OF COD LIVER OIL IN EIGHTEENTH CENTURY.
From Peters' Pictorial History of Pharmacy. G. P. Englehardt & Co.

Within the past five years the real reason for its curative power has been found in its high content of vitamines, those potent food accessory substances discovered within the present generation.

And now, what of the end of our tale? What have we learned from our quest? How can we best profit by it? One impression stands out conspicuously. Very little of the knowledge of the past was accurate. Can we be certain that we are right today or are we bound by the wheel of fate to go on as each generation has done before, correcting the errors of its predecessors and leaving other errors equally inexcusable for its successors? Out of the past comes news of strange doings, light from flickering torches, truth dis-

torted by those who cannot distinguish it from error, and strength —strength to carry on in spite of handicaps and discouragements, looking toward the time when each shall see things as they exist and not as he imagines them.

News from the past.
The mysterious Orient sends its silent message
Through divers channels learned by modern man;
Of scouraging hordes, of kingdoms overthrown,
Of birth, of love, of death, of strife, of peace;
The steles of stone and bricks of ancient clay
Transmit the message of the mighty years.
News from the past.

Light from the past.
What occult force is that which lights the darkness
Of this the present? Down from mystic times
Whose beam is so diffused that few can tell
Where shadow ends and light begins, we search,
Groping, with hands untrained as yet, to find
That which we seek, yet knowing not its name.
Light from the past.

Truth from the past.
The question still unsolved, yet solved anew
By each succeeding age is—What is Truth?
We learn the answer now, but when tomorrow comes
We find we know it not. What force
Thus blocks our quest and takes the prize away
When we are near the goal. 'Tis God's almighty hand.
Truth from the past.

Strength from the past.
That first dynamic force which urged the cell
Primordial to function, and beget its kind and live,
Still urges us; though centuries elapse
Our strength is yet unspent. Whence comes this flood
Of power strong and sweet? When rightly used
It brings us close to Him who gave it first.
Strength from the past.

SUGAR.*

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When David the Psalmist desired a simile of attractiveness, he said of the ordinances of his Lord: "Sweeter also than honey and the droppings of the honeycomb." He had never heard of sugar. You may search the Bible from cover to cover and you will find in it no mention of this common foodstuff. Wheat and barley, salt and vinegar, milk and wine, mustard and cinnamon, and many other of our foods and condiments are referred to, but of this great savory and food not a single reference.

Alexander the Great, in getting ready for that famous lachrymation over the lack of more worlds to conquer, 325 years before the Christian Era, sent an expedition into India, commanded by Nearchus. The soldiers from this invasion brought back to Greece both tales and samples of a wonderful reed, that grew in the far-off Indies, whose juice had the sweetness of honey. It was, perhaps, a knowledge of this expedition that led the old Greek botanist, Theophrastus (who was a contemporary of the great Alexander), to say: "The generation of honey is threefold; the first sort is from flowers or other things in which there is sweetness, the second from the air and falls particularly in harvest time, the third sort is from canes or reeds."

These Greek soldiers brought back pieces of the sugar cane to Europe but it is doubtful if they ever saw sugar itself. While there is reason for believing that the manufacture of sugar originated in Bengal, we have no idea of when. The first clear reference to it in European history was nearly 400 years after Alexander had died. In the first century of the Christian Era there lived in Rome a Greek physician named Dioscorides, whose writings on medicines have remained the admiration of druggists and doctors for these 1900 years. In one of his books he speaks of a substance found upon reeds in India and Arabia: "There is a sort of concreted honey found upon canes in India and Arabia. It is in consistence like salt and it is

* One of a series of popular lectures given at the Philadelphia College of Pharmacy and Science, season 1924.

brittle between the teeth like salt." Even 600 years later than this we find another famous medical writer, Paul of Ægina, saying: "The Indian salt is in color and form like common salt, but in taste and sweetness like honey." That sugar was known to the Asiatics many centuries before it was first brought to Europe, is shown by the very name we give it today, for the ancient Arabs had two forms of this sweet substance, one which resembled salt and which they called "sukkar" and the other in lumps which they called "kand." Thus the probable origin of the word candy.

For more than ten centuries sugar remained a curiosity known only to the learned and used only as a medicine. In the year 1353 King John II of France issued an ordinance forbidding the apothecaries of Paris from substituting honey for the good white sugar; evidently in those days sugar was a more expensive drug than honey.

As late as the seventeenth century a German doctor, named Sala, writes of the medicinal virtues: "Sugar used in a proper manner nourishes the body, generates good blood, cherishes the spirits, and makes people prolific. It is serviceable in complaints of the throat and lungs, hoarseness and defect of breathing, for ulceration of the lungs, chest, kidney and bladder. It eases pain of the intestines, it cleanses wounds and punctures in the body, it removes pains in ulcers and tumors by concocting a flux of humors" . . . which sounds like the claims of a modern patent medicine. His panegyric was not universally accepted, for we find his contemporary, Theophilus Gancieres, in 1647, writing: "Sugar and all kinds of sweetmeats are very hurtful in consumption of the lungs, and, as I conceive, the so frequent use of these things tends much to create that disease." And an English physician named Ray in 1688 says: "In regard to the scurvy, some more modern physicians, as well as those of ancient times, agree that it is produced by the too great use of sugar, and that the latter is very hurtful to the teeth and not only renders them black but causes them to decay and to loosen in their sockets, which are certain signs and symptoms of scurvy."

Just when sugar began to be used as a foodstuff is uncertain. It was an article of commerce in the fourteenth century but the price of it limited its use solely to the rich. The average price of sugar in England about the year 1400 was 1 s. 7 d. per pound, which, considering the relative purchasing power of money, would be equivalent in our day probably to two or three dollars. You who

have been excited when the price of sugar jumped to twelve or fourteen cents a pound should be grateful that you do not have to sweeten your coffee with Huyler's candy!

But before we go any further in our study of this interesting substance, let us turn aside for a moment to consider what it is we are talking about. I presume if I were to ask you, "What is sugar?", most of you would say that it was a white granular substance with a very sweet taste. Perhaps on second thought you would recall that sugar is not always white, thinking of maple sugar or a common brown sugar, but many persons are surprised to know that some kinds of sugar are not even sweet. Chemists of today recognize many kinds of sugar. For our purposes we may divide them into two groups, the simple (Monosaccharides), and the double, sugars (Disaccharides). In the first group are included dextrose or grape sugar and levulose or fruit sugar; the most important disaccharides are sucrose (cane sugar), lactose (milk sugar), and maltose (malt sugar).

Sources of Common Sugars.

MONOSACCHARIDES ($C_6H_{12}O_6$)

Dextrose (Glucose)—Honey, Grapes, Cherries, etc.
Levulose (Fructose)—Most Fruits.

DISACCHARIDES ($C_{12}H_{22}O_{11}$)

Sucrose—Sugar Cane, Beets, Maple Trees, etc.
Lactose—Milk.
Maltose—Germinating Grain.

The original prehistoric man must have derived much of his nourishment from some form of sugar. He was not fleet enough of foot, nor—until he had invented the use of weapons—sufficiently powerful to have been enough of a hunter to derive much of his food supply from animal sources. His digestive organs were not suited to utilize grass and leaves, as do the cow, deer and other herbivorous animals. He had not learned the art of agriculture and therefore had no grains, as wheat or corn, which today form the staple articles of food. He must have lived largely on roots, most of which contain relatively little nourishment, and on fruits, with an occasional feast of wild honey. In both the latter, the fruits and the honey, the nutritious part is practically all sugar. We may,

therefore, regard man as the natural sugar-eating animal, whence perhaps we have derived our extraordinary love of sweets.

There is one striking difference between the sugar-eating habits of the prehistoric savage and those of the modern flapper. Practically all of the sugars available to the primitive adult, such as those in fruit or honey, belong to the group of simple sugars, while, as I have previously said, cane sugar belongs to the group which the chemist calls disaccharides. It is a striking fact that the body is able to utilize, directly, that is, to derive energy from, only the simple sugars; cane sugar must first be broken up into simple sugars, that is, it must be digested, before its food value is available as energy.

As I have already intimated, the production of sugar seems to have originated in India. China was acquainted with sugar long before Europe and perhaps may have originated the form of sugar that we know today as rock candy, but the evidence is strong that granulated sugar originated in India. The Chinese themselves, acknowledge that they learned the art of sugar-making from the Indians. The sugar cane is native of Asia and the East Indies islands. Some writers believe that it also occurred naturally in the South Sea Islands of the Pacific and even in tropical America. But even if this view be correct, there is no evidence that the aboriginal inhabitants ever made sugar from it. It must be noted that contrary to the ideas of old Dioscorides and his contemporaries, white sugar is a manufactured substance; the cane juice will not crystallize merely by exposure to the air and does not concrete on the reeds, as they asserted.

The knowledge of how to prepare sugar from cane juice which originated in Bengal, no one knows when, spread to China in about 700 A. D. and through Persia to northern Africa in the ninth or tenth century. From their home in Africa the Moors carried sugar culture to Spain in the latter part of the tenth century. The European peoples, however, did not begin to make sugar, at least in any quantity, until about the time of the discovery of America. Fourteen years after Columbus landed on the island of Haiti, the sugar cane was transplanted there from the Canary Islands to the West Indies and shortly afterwards was established the first factory for manufacturing sugar in the new world, which was soon to supply Europe with such quantities of the "sweet salt" that it might become an important article of diet for even the poor. From this

beginning the cultivation of sugar cane and the manufacture of sugar spread rapidly through the West India Islands and to the neighboring sub-tropical coast of the American Continent.

While time will not permit me to consider in any detail the sources and manufacture of sugar, a brief reference to the general principles may not be out of place. The name "cane sugar," as convenient as it may be, is not strictly accurate, because this sugar is obtained not only from the sugar cane but also largely from beets, and, to a small extent, from maple trees and a species of palm tree, as well as another grass-like plant known as sorghum. We in this country are apt to think of sugar as a product of the tropics because the bulk of our sugar comes from the island of Cuba and the neighboring tropical regions. It may surprise some to know that before the war Germany was the greatest sugar-producing nation in the world, their annual crop being over 2,700,000 tons, all of which was extracted from beets; while the annual production of Cuba at that time was about 2,400,000 tons. Today the Cuban production is over three million tons.

The major portion of the sugar consumed in the United States comes from the sugar cane grown in the island of Cuba, although upwards of a million tons of sugar is produced from beets grown in this country as well as some from sugar cane and small quantities from sorghum.

The sugar cane is usually grown from cuttings rather than from seeds. It requires from one to two years, according to climate and soil, to reach maturity. When it is full grown, it is harvested by cutting close to the ground and the cane hauled to nearby mills, where the juice is expressed by rolling between iron cylinders. It is, however, not possible to obtain all the juice, more than one-fourth of it ordinarily being left behind. The expressed juice consists of about 80 per cent. of water, 17 or 18 per cent. of crystallizable sugar and small amounts of other vegetable substances. To this raw juice is added a small amount of lime and it is allowed to stand until a scum rises to the top. The clear underliquid is drawn off and boiled to a thick syrup, which is then allowed to cool in shallow vessels, during which process a portion of the sugar crystallizes out. The liquid syrup remaining is then drawn off and constitutes what we call molasses. This first molasses may be further concentrated and made to yield a portion of the sugar which it still holds. The crystallized parts separated in this way constitute what is known as

raw sugar, or muscovado, and is usually shipped to the refineries in the United States, some of the largest of which are here in Philadelphia. In these refineries the yellowish raw sugar is purified by filtering a hot solution, decolorized with bone black and recrystallized by boiling in vacuum pans.

Through the successive stages of curiosity, drug and condiment, sugar has become one of our most important foodstuffs. In order to appreciate the advantages and disadvantages of sugar as a food, it is necessary to digress for a moment to consider the different kinds of food that are necessary for our health. Our bodies are engines which derive their power from burning fuel which is obtained from the food we eat. In addition to fuel our diet must furnish us with material for replacing parts of the machinery that become worn out. In other words, foods are of two kinds: those which furnish energy and those which are useful as body builders. The body-building foods are of two sorts; first, those which contain a complex substance known as protein, the basis of meat; and secondly, certain mineral elements such as lime, iron, salt, potash, etc. It is very evident that the growing bodies of children need a larger amount of these foodstuffs, because not only must there be sufficient to make good the wear and tear upon their engines, but there must be enough to furnish material for enlarging the engine. While a certain amount of energy can be derived from the protein elements of our diet, the chief fuel foods may be divided into two groups: first, the fats; and secondly, a class of substances known to the chemists as carbohydrates, which includes the various forms of starch and the sugars.

It must be understood that most of the things we eat contain several of these four elements of food. Milk, for example, contains all of them: protein, mineral, fat and sugar. Meat contains protein and fat and some mineral but no carbohydrate. Bread, at least if made from whole wheat, contains all the necessary body builders, both protein and mineral, as well as a large amount of carbohydrate, but no fat; ordinarily we make up for this lack in bread by spreading it with butter, which is pure fat.

Most of our ordinary foodstuffs contain a large amount of material that is not nutritious in any way. When a food contains very little waste material we say it is a highly concentrated food. Chemists, for the sake of measuring the nutritional value of different foods, have invented a unit of measure which they call the

calorie; they speak of a certain quantity of this or that food representing so many calories. Perhaps I can give some vague idea of what the calorie is by saying that the ordinary adult requires about 2000 to 3000 calories a day, according to the amount of exercise he takes.

While practically all foods contain more or less waste material, there is an enormous difference in the concentration of various articles of diet. For instance, a pound of potatoes contains approximately 500 calories; a pound of beef, about 1100 calories; a pound of onions less than 200 calories; a pound of milk about 350 calories. There are few foods which come on our table that are as concentrated as sugar. One pound of sugar represents over 1800 calories. It is also a relatively cheap food. A hundred calories of roast beef costs about three cents; a hundred calories of milk costs about two cents; a hundred calories of sugar costs about half of one cent. Moreover, sugar is a food which is easily utilizable by the body. Every householder knows that some substances are more easily combustible than others. A pound of wood has less fuel value than a pound of coal, but it is much easier kindled and burns much more rapidly; kerosene is of no greater fuel value than paraffine, but it is much more inflammable. So we find certain foods which can be much more easily burned up in the body, or, as the chemist expresses it, are readily assimilable. The ease with which these foods are consumed bears no necessary relation to their food value. Sugar is, of all the ordinary foodstuffs, probably the one most easily and most rapidly burned up.

The promptness with which sugar is utilized by the body is due, at least in part, to the fact that it is already half digested. It is, however, not entirely prepared for the nutrifying of the body. As I have already mentioned, among the carbohydrates the only ones whose nourishment is directly available to our tissues are the simple sugars, levulose and dextrose. It is necessary, therefore, that cane sugar be changed from a disaccharide to a monosaccharide. This alteration, which the chemist calls "inversion" of the sugar, is brought about by certain digestive secretions in the intestines. In the digestion of starches there is first formed a disaccharide, probably maltose, which is then inverted into dextrose and the latter is carried by the blood to the muscles and other organs of the body. The blood always contains a certain amount of sugar in the form of dextrose. After a meal, containing either sugar or starch, the

amount of sugar in the blood is increased beyond that which is immediately needed by the tissues; this excess is removed and stored up in the liver to be gradually given back to the blood during the periods between meals. If large amounts of sugar are eaten, the absorption from the intestines into the blood stream may become so rapid that the liver is unable to remove the excess, in which case sugar will be excreted by the kidneys and appear in the urine.

The disease known as diabetes, which is characterized by the presence of sugar in the urine, is due to the inability of the body cells to burn up sugar. While the presence of sugar in the urine, which occurs after eating large amounts of this food, is a very different condition from true diabetes, there is strong reason to believe that the continual excessive use of sugar may eventually lead to this disease.

Let us sum up now the points in favor of sugar as a food. They are: its high concentration, relatively low cost and ease of assimilation. While cane sugar is a comparatively inexpensive foodstuff, it is by no means the cheapest and but little importance is to be given to this point. The lack of waste, that is, the high food value in proportion to weight, makes sugar a valuable addition to the diet when transportation facilities are limited. For this reason it usually forms part of the emergency ration for marching troops or among Arctic explorers. Because of the rapidity with which it is absorbed, sugar has a remarkable restorative effect in conditions where the nutritive supply to the tissues has been temporarily exhausted. These conditions may occur not only as the result of starvation but also after strenuous muscular exertion. When a man is in a state of physical exhaustion stimulants, like tea, may cause a temporary benefit, but sugar will not only promptly relieve the symptoms of depression but is a true curative agent because it furnishes the hungry tissues of the body their needed nourishment.

On the other hand, sugar has certain striking disadvantages or rather limitations. Indeed, some of the conditions which we have quoted as advantages of sugar, such as the lack of waste and the ease of assimilation may, under some conditions, become undesirable instead of advantageous factors. In the first place, it is to be noted that sugar contains absolutely none of the body-building elements, neither protein nor mineral. A man would starve to death on a diet composed of sugar alone, provided he did not die of indigestion. This lack of body-building elements is especially impor-

tant with growing children. Our American love of sweets which manifests itself in the enormous consumption of candy, and of the so-called soda water drinks, is injurious enough to adults but still more harmful to children. Not only does sugar fail to provide the proper building body elements, but, like the dog in the manger, prevents the child from taking the proper quantity of more complete and essential foods. Because of its high fuel value and ease of combustion, it meets, at least temporarily, energy requirements and thereby lessens the demand for more useful foods; but more than this the sweet taste has a very manifest tendency to kill the appetite. Many a mother has been able to detect the forbidden use of candy by the lack of appetite for supper.

Besides this negative deficiency, it has certain positively injurious qualities. Strong sugar solutions are locally irritant to the mucous membrane, and large quantities of sugar or of candy, especially taken without other food, are therefore liable to irritate the lining of the stomach and give rise to symptoms of indigestion. It has been experimentally found that large quantities of sugar have a distinctly retarding effect upon digestion. Moreover, as is well known, sugar is a very easily fermentable substance. In the process of fermentation not only is its own food value destroyed, but it also gives rise to compounds that are actively injurious. This decomposition may take place anywhere in the digestive tract until the sugar has been absorbed. If it occur in the mouth the acids formed by fermenting sugar will attack the enamel of the teeth and give rise to a focus of decay. A dental friend of mine said to me the other day: "I can tell a candy fiend as soon as I look in his mouth." The injurious action of candy on the teeth, especially of children, is an old story; I read not long ago a book published by a Dr. Short, of London, in 1750, in which occurs the following sentence: "Sugar on distillation contains an acid penetrating spirit which rots the teeth of its excessive consumers and exposes them to bad fevers." The decay of the teeth is, in my opinion, due not alone to the direct local action of the sugar and its decomposition products, but also in part to the effect on appetite and consequent neglect of those foods which contain the mineral substances requisite for the upbuilding and maintenance of tooth structure.

Of course there are many diseased states, such as gout, diabetes, dyspepsia, etc., in which the use of sugar is directly injurious.

But the consideration of these would take us too deeply into the realm of medical science to be profitable for the present purposes.

As far as the normal healthy individual is concerned I may sum up my views on the use of sugar as a daily foodstuff are as follows: In moderate amounts sugar is a cheap and pleasant addition to the diet whose use is on the whole rather beneficial than harmful. On the other hand the large quantities consumed by the average American are likely to have an undesirable effect on the health. The per capita consumption of sugar in the United States is about eighty-five pounds a year, while in France and Germany it is less than fifty pounds, and in Italy only eleven. A pound and a half of sugar a week for each of us, adult or infant, seems rather an excessive amount. Just how much of this is consumed in soft drinks I do not know, but I may remind you that the ordinary glass of "soda water" represents about one and a half ounces of sugar; one soda a day would mean twenty-seven pounds of sugar a year.

NATIVE CHINESE METHODS OF DRUG ADMINISTRATION.*

L. K. Sung, B. A., M. D.†

No science in its widest significance, in its correlation of all knowledge, can be properly appreciated apart from a consideration of its evolution. In the spirit of sympathy of men for men and the desire to help others, came forth the science of medicine. To show how various forces have influenced the development of medicine is a subject too vast to compass in the time allotted to me. I shall therefore confine my topic to the native methods of drug administration in my country, China.

The earliest practitioners of any sort in China, as in any other country, may be designated as herbalists. Among us the pioneer in this field was Ching Nung, a contemporary of Menes I, of Egypt, about 2000 B. C. In all probability he discovered the medicinal virtues of the herbs by watching the instinctive use made by

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animals. Subsequently he tasted all the herbs that appealed to him, and the results of his experiments form the bases of all subsequent studies. To him, then, one may attribute the foundation of the medical science in China.

Though his devotion to the study of medicinal plants was unexcelled in his days, and maintained him the premier position in materia medica for several centuries, he was somewhat indefinite in his description of the plants and would often be contented in calling a herb, "hot" or "cold."

The science of medicine was so little understood and so imperfectly developed, that such empiric practices would naturally lead the people, at the early period of their civilization, to another direction. The curiosity to inquire as to the causes of injuries and accidents, either beneficial or fatal, led the people to seek the causes in supernatural agencies. Hence the development of medicine in China passed through the stage of sorcery or witchcraft, as has been the case in European countries. We learned from Macauley that Samuel Johnson was brought to kiss the diamond bracelet of Queen Elizabeth, that he might be cured of his inherited malady, and from Sir Walter Scott how astrology had a hand even in the affairs of the English or French courts. Such incidents may also be paralleled in the pages of the development of Chinese medicine.

Disease, according to the mystical conception, is not natural but spiritual. To the men of early days it was the influence of some external evil agent that accounted for the causes of human sufferings. When forced to believe such conceptions, efforts to relieve humanity from ravages of diseases were directed to guard against the encroachments of demons, spirits and diabolical monsters.

Magic, amulets, charms and incantations were thus considered to be the chief weapons of defense against the unclean spirit of the universe. Drugs would then be administered to the sick, accompanied by some form of mystic formalities. At one time it was widely believed that disease was transferable by means of certain foolish ceremonies. In legendery books, prescriptions of such nature were recorded. Such superstition, however, finds no place in the present stage of development.

During the development of medicine, it was natural for the Chinese herb experts to experiment with vegetable drugs especially, and to put them in a form convenient to take or to apply. This brought forth the supreme art of preparing and administrating medi-

cines. The records of the introduction of infusions, decoctions and ointments date back to the early history of China. By infusion, we mean those liquid preparations made by steeping vegetable substances with hot water and allowing the mixture to stand until cold. However, in some cases, cold water itself is sufficient for the purpose. But decoctions differ from the preceding by subjecting the drug to the process of boiling. Both methods are employed extensively in China.

To facilitate the process of infusion or decoction, the Chinese mind conceived even at this early stage of development that the medicinal substances in their natural state should be reduced to small particles or cut to convenient sizes before they are used. The herbs and barks in large pieces are divided into desirable lengths usually by means of a metal chopper or cleaver fastened to a prescription counter; the roots, or tubers are sliced into small segments. Fruits and nuts occur in their natural form or are pulverized in big iron or stone mortars. Occasionally they have to resort to big old stone mills similar to the buhrstone mills originally used in France. These medicaments are stocked in the native drug stores and ready to be dispensed at any moment. Upon the presentation of prescriptions bearing the concise direction for preparation and administration by the physicians, the druggists in charge will go to his medicine closet for the prescribed drug. This closet is divided into numerous small compartments or drawers each containing a specific kind of medicine. The druggist will then weigh out accurately each ingredient on a native-made scale, and wrap them separately in a sheet of rice paper. To avoid any possible mistake, the ingredients are checked over with the prescription by another employee in the drug store. The neatly wrapped package is then carried home to be prepared by infusion or other methods as directed. Strange to say that a large majority of the people could readily identify crude Chinese drugs in ordinary prescriptions and give a second check to the ingredients when the drugs are unwrapped at home. Then the process of infusion or decoction is attended by an experienced member of the family, and the duty of the pharmacist is to give instructions as to the necessary processes of preparation. This will briefly illustrate the relative responsibility assumed by the various parties: the doctor, pharmacist and the patient's family. Filling the prescription with right ingredients, and weighing the ingredients correctly are the chief concern of the drug-

gists. Other matter pertaining to preparation will largely rest on the shoulders of the patient's family.

To further your interest in the process of infusion and decoction which are still extensively adopted in China today, I shall attempt to describe both processes: In infusion, actively boiling rain water, previously collected in a suitable container, or in some cases

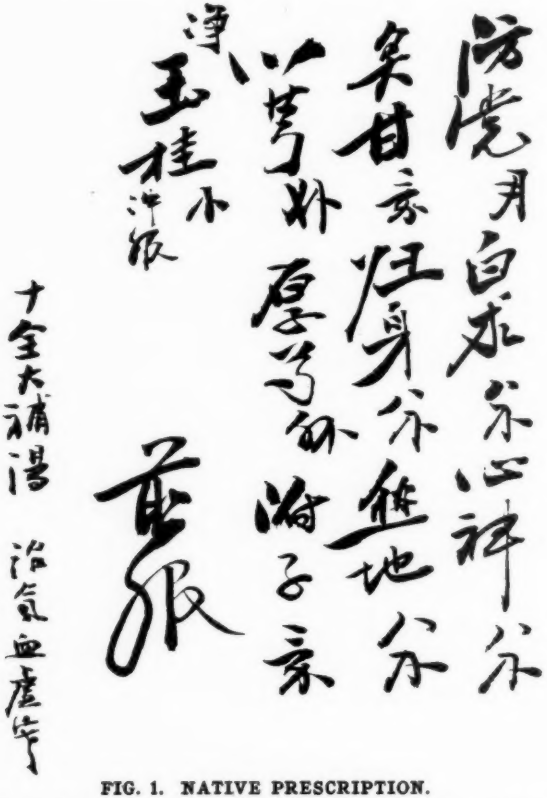


FIG. 1. NATIVE PRESCRIPTION.

A popular Chinese prescription, ginseng, cinnamon, magnolia, etc., intended to produce stimulating and restorative effect in general debility and cachexia.

mineral water, is largely used for macerating the drug and hence the making of infusion. For decoction the drugs are first dumped into a porcelain or some kind of earthernware pot containing the necessary amount of water and the mixture is heated on an open fire of low flame. When it is boiled down to a certain volume, the

mixture is poured into a clean bowl and the patient generally takes it while hot at one dose. The process may be repeated for a second extraction if necessary. This will show the general practice of administering drugs, particularly in case of potent medicines, where the presence of a large amount of diluent, *i. e.*, water is necessary. In addition to the intended medicinal virtues of these drugs, the drinking of a large amount of hot watery mixture will invariably induce active sweating and consequently will be of value in certain renal and febrile diseases.

The development of pulse study is another phase of interest in the Chinese medical field. It reached its height at the time of Wah Touh, the Luther of Chinese medicine, 200 A. D. According to his theory, "each part and organ had its own proper pulse, and just as in a stringed instrument each chord had its own tone, so in the human body if the pulses were in harmony, it meant health; if there was discord, it meant disease." [1]

The other distinct line of special interest were organotherapy. vaccine therapy and acupunctation. Various parts of organs, secretions and excretions of man and animal were successfully employed in the treatment of certain diseases. It is indeed noteworthy to find that the inoculation of virus obtained from those affected with smallpox to the healthy individual was practiced as early as the eleventh century in China. If once successfully inoculated, one will be probably immuned to smallpox for life. The art of acupuncture was practiced at a still earlier date by native surgeons, about the seventh century. The manipulation consisted of thrusting long silver or silver alloyed needles into the affected part to introduce medicaments. It was claimed that such acupuncture was of great value in cases of extreme weakness of limbs and in some cases of paralysis. Other historical records in medicine also reveal an indication of the effective use of inhalation of medicinal steam in various nasal troubles. The employment of mercurials in combating different stages of syphilis was also found. The diseases like hæmophilia and jaundice have similarly received early attention. Some unknown physician at this period advanced the view that there were self-generated poisons in the human system and such theory seems to harmonize with the modern views of ptomaines and leucomaines.

[1] "The Evolution of Modern Medicine," William Osler.

Considering those numerous verbal and written formularies corresponding in many respects to the modern idea of a pharmacopœia, the earliest collection of formulas showing evidence of supervision of drugs was the celebrated "herbal" of China, entitled Pan-Tsou-Kan-Muh, written by Li-She-Chin in the middle of the sixteenth century. It is the first attempt to fix some standard to the large number of drugs employed in the native practice. It gives infor-

FIG. 2. ANATOMY.

A diagrammatic sketch of the human body, taken from an old Chinese medical text, showing anatomical relations of the important organs.

mation as to the value and sources of drugs of animal and mineral origin, in addition to the detailed discussion of the botanical, aspects and therapeutic properties of vegetable drugs. Hence it is a pharmacopœia in the modern sense of the term. Among the useful plant drugs described in this herbal, may be mentioned rhubarb, licorice, cubeb, ginseng, aconite, aloes, camphor, ergot, etc., and

these are either of the same or of similar species now extensively used in America and Europe.

Aside from the medical theories and practices, China is by no means behind in pharmaceutical arts, such as the making of pills, essences, extracts, ointments, plasters, etc. In practice there seems to be little difference between an extract and a pill mass. The menstruum employed in making extracts, pilular or fluid, is largely the universal solvent-water; alcohol to my knowledge has never been used in its place. However, some preservative is added to the finished product. There are quite a few extracts that are of value and interest to the people, of which the extract of ginseng is an outstanding example. This particular extract is one form of fluid extract (without alcohol) of Panax quinoquefolium (ginseng) made by carefully decocting the root drug in water and evaporating to a pasty consistency in a suitable vessel. The effectiveness of this preparation largely depends upon the authenticity of the crude drug. The ginseng which is considered to be the best is the wild-growing variety of Manchuria. I have heard of a single root being valued at 250 times its weight of silver. This particular drug, as claimed by the majority of Chinese, is the medicine par excellence; a remedy last to be resorted to when all other drugs fail. The high, inestimable values attributed to ginseng as a tonic, restorative and powerful stimulant have been and are today the prevailing belief among the Chinese, but it has yet to be verified by scientific research.

Pills are oval or round bodies made by incorporating medicaments with ordinary rice or wheat flour as a base and honey as an excipient. They are coated with sugar or silver, occasionally with wax if the pills are to stand for a long period of time. This is quite a popular form of drug administration in the native practice.

Essences, a distinct class of preparations, involves the fundamental principle of distillation. The method of preparing the aromatic essence by distillation in China, according to G. A. Stuart, a missionary physician to China, was brought from the West at a comparatively late date. But I have seen authentic facts recorded that skillful preparing of essences was a distinct art of the Chinese pharmacists at the beginning of the Ming Dynasty, about 500 years ago.

Lastly, the preparation of plasters enjoyed quite a reputation by the Chinese people. It is more or less in the nature of semi-solid

extracts adhered to the middle of some form of clean gauze. Before applying the plaster, it is warmed to make its consistency such that the extract will be sticky and adhere to the body. It is considered to be quite efficacious in the treatment of sprains, inflammation of joints, etc.

In the evolution of medical science China has undergone the various stages of progress as have been experienced by the European world. From the dawn of botanical and pharmacological studies made by Ching Nung, 2000 B. C., to the publication of the Chinese "herbal" by Li-She-Chin, at the middle of the sixteenth century, China passed from sorcery and empirical practices to the discovery of organotherapy and vaccine therapy, in fact, even to the extent of suggesting the theories of ptomaines and leucomaines. During this period much skill was also developed in the preparation of medicines and their correct application.

With increasing contact with the West, there developed the desire to adopt European practice, as evidenced by the growth of missionary medical schools in China in the last thirty years. In many respects, the views held by the native physicians are often diametrically opposite to that of the Western practice, the obvious difference in theory and practice of medicine will naturally give rise to jealousy and rivalry. From the standpoint of efficiency and practicability, Western practice is foremost in preventive medicine and surgery in general, while the native practice claims much for their treatment of many internal diseases. In my opinion, however, there should be a compromise between the two schools, in that each one should contribute what is best in it, bringing perfect harmony in the practice of medicine in China.

In conclusion, I desire to call the attention of those who are interested in pharmacological research, to the vast field for investigation and study of Chinese medicinal plants. Though great scientists like Hambury, of London, and Loureiro, of France, have made numerous important observations on the subject, it is still far from exhausted. Research in this field cannot help but throw light upon the origin and development of medicine in the Western world.

FURTHER NOTES ON RODILLON'S TEST FOR NITRITES.

Henry Leffmann.

Recently in this JOURNAL (1923, *95*, 110), I reviewed the tests proposed by G. Rodillon for nitrites in water, depending on the use of a mixture of resorcinol and strong sulphuric acid. By inadvertence, I referred to *Ann. Chim. Phys.* instead of to *Jour. Pharm. Chim.* in which the communication appeared. The remaining data of the reference were correct. The article was abstracted in *Chem. Zentr.* (Tech. Teil, 1923, *3-4*, 78), but by mistake it was stated that the directions given by Rodillon were not fully observed as to proportions of acid and resorcinol. As a matter of fact, I used a solution made up exactly as Rodillon directs, but for comparison made up a solution somewhat different. Neither solution gave me satisfactory results, and I reported that the test seemed to be of little value, especially in comparison with the tests already available. Hans Heller has communicated to the *Chem. Zeit.* (1923, *47*, 701), that he has found the test satisfactory, but gives a somewhat different formula than Rodillon. I have repeated Heller's method carefully. It consists in dissolving 0.4 gms. of resorcinol in 5 cc. of strong sulphuric acid, without heating. The reagent solidifies on standing, but Heller says that it can be liquified by adding a drop of water. I have not found this to be the case. Even several drops do not bring the solid material into satisfactory solution.

It occurred to me, however, that the test might be made more simple and convenient by dissolving the resorcinol in the water and floating this on the sulphuric acid. Experiment showed that this is possible. Nitrite-free water floated on strong sulphuric acid, gives no appreciable effect after about half an hour. Water-samples containing but small amounts of nitrite give, within a few seconds, a brown ring at point of contact and a yellow liquid above. I do not consider the test of much practical value, as it is inferior to that in which metadaminobenzene is used and also to the extremely delicate, but accurate and convenient test with sulphanilic acid and alpha-aminonaphthalene.

It was thought advisable to determine if nitrates interfere with the test, as water contaminated with nitrites is usually rich in nitrates also. Experiment showed that even with quantities above what are usually encountered in natural waters, no appreciable interference occurred.

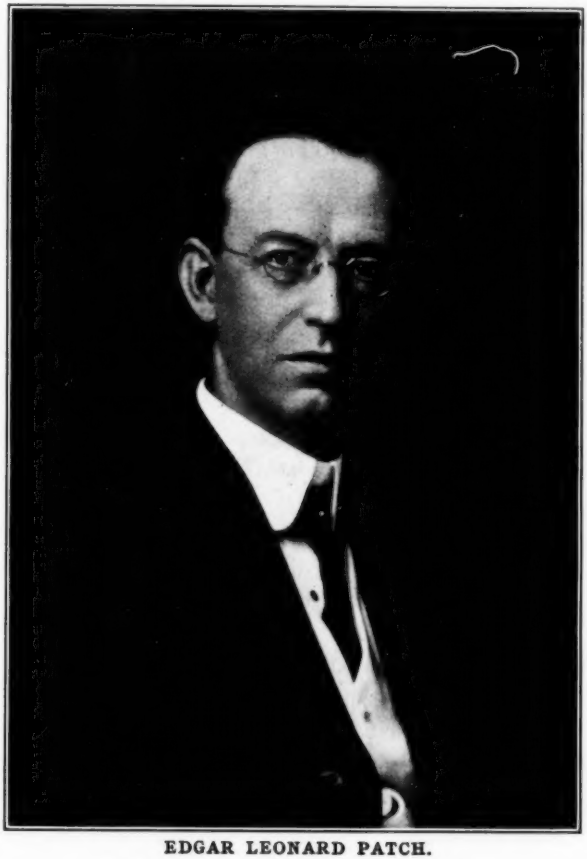
Research Laboratory,
Philadelphia College of Pharmacy and Science.

IN MEMORIAM.

EDGAR LEONARD PATCH.
1851-1924.

Edgar Leonard Patch was born in Spencer, Massachusetts, December 2, 1851. His early years were spent in Worcester and Clinton. The death of his father placed upon his shoulders when he was a mere lad the responsibility of caring for his mother and younger brothers and sisters and compelled him to leave school at an early age. By close, almost heroic application, however, he made up for lack of schooling by private study and reading and became a man of wide learning and culture. After working at various "jobs" he finally became clerk in a Clinton drug store. Ambition soon led him to Boston. This was about the year 1860. It was not long before he had his own business in a partnership known as "Canning & Patch," the store being located at the corner of Green and Chambers Streets. It was for twenty-five years a famous Boston drug store and carried out young Mr. Patch's high ideals of what such a store should be. There was no candy counter, no cigar case, no soda fountain, and especially no back shop for the illicit selling of liquor, as was all too common in the drug stores of a past generation. Meanwhile the young druggist had received his diploma from the Massachusetts College of Pharmacy, in 1872, with a remarkably high scholastic record. Two years after graduation he was made treasurer and registrar of his alma mater, and in 1879 was elected Professor of the Theory and Practice of Pharmacy. This was a high honor for a young man only twenty-eight years old. During the many years that he taught his specialty at

this Boston institution he helped educate thousands of druggists, and these old pupils of his scattered all over the world loved to keep in touch with the Professor by letter and visit. It was almost entirely through his efforts that a new building for the college was erected in 1885-1886, and through him the interest of George R. White, the donor of the present splendid building, was elicited.



EDGAR LEONARD PATCH.

He contributed frequently to the scientific and trade journals of his profession and business, and in 1893 was elected president of the American Pharmaceutical Association.

In 1889 he lent his name and technical advice to the manufacturing concern that has now become a famous institution. His high standing in the drug world made the trade-mark "E. L. Patch" an

open sesame with dealers everywhere. The time and attention that the presidency of this company demanded compelled him, reluctantly, to give up first his teaching and then his retail business.

Professor Patch joined the American Pharmaceutical Association in 1872. The first record of his active participation in the deliberations of the Association is in the proceedings of 1881. From that time on he made frequent contributions to the advancement of pharmacy. Some of these are of special value. He never offered any matter that was not the result of previous thorough study and investigation.

To be able to occupy more time in laboratory investigations, he fitted up two rooms in his own house, where early and late he delved into problems on the solution of which he was able to speak later authoritatively.

One explanation of Professor Patch's thorough preparation for his work lies in his wonderfully developed power of will.

In 1870 he wrote, "I have decided to give one hour a day to study, eight months of the year to subjects relating to my business, and four months to general knowledge." How tenaciously he held to this resolution is well known to those who were associated with him. His daily hour frequently had to be taken in fractions, often at the peril of his health, as when it came out of his hours of sleep.

When he went out to lunch he carried with him cards, on which he had written materia medica, or botany, or chemistry facts, which he mastered card by card. The knowledge thus acquired stayed by him until the end. Often when walking in the fields with his children among the flowers he loved, he would pluck a flower and recite over to his boys its various names, habitat, family, etc., so that today those boys recall that their first introduction to many a flower was through their father.

The thorough knowledge of subjects which most directly concerned his profession attracted young medical students who did not find in their medical school the facilities for mastering what they believed they needed in the way of the facts of their materia medica. They frequently came to his back shop, where he served as their preceptor. Among these was young Wood, who now is Governor Wood, of the Philippines.

The work accomplished by Professor Patch in life would have taxed the energy of the strongest man. When we learn that at

the age of eighteen he was smitten with the dreaded tuberculosis which had carried away his father, three brothers and two sisters, and had been told by the doctors that his days were numbered, the story of his conquering this scourge reads like a miracle tale. To arise from the bed on which the night before he had collapsed with a hemorrhage and return to the city to work, would even now be called suicidal. An instinct which directed him to the proper self-treatment when the doctors were still for the most part ignorant of what to do and the indomitable will power which sustained him through his weakness, served him well. An X-ray taken later in life showed that the doctors had been right in their diagnosis, although not in the prediction of the number of his days. Only four years later he permanently injured himself lifting a heavy weight. This hindered greatly his physical activities in later life.

His death at his home in Stoneham, Mass., on February 27th, terminated an active, useful career, successful despite severe handicaps.

The death of Professor Patch removed from the ranks of pharmacy another member of the group of stalwart men whose unselfishness, industry and sincerity will live long to inspire and sustain those who follow in their climbing footsteps.

SCIENTIFIC AND TECHNICAL ABSTRACTS

HEAVY METALS DESTROY VITAMINS.—The use of copper utensils in the pasteurization of milk may cause destruction of the scurvy-preventing vitamin, states a report to the American Medical Association by Dr. Alfred F. Hess and Mildred Weinstock, of the College of Physicians and Surgeons of Columbia University. The copper may be present in quantities far too small to cause copper poisoning and yet be sufficient to destroy practically all of this essential vitamin.

This anti-scorbutic vitamin C is known to be destroyed by oxidation. This was proved by heating milk to which a small quantity of hydrogen peroxide, an efficient oxidizer, had been added. This is suggested by Dr. Hess and Miss Weinstock as a possible reason for the increase in infantile scurvy in Berlin, where small amounts of

hydrogen peroxide have been legally permitted as a preservative for milk.

The experiments just completed by these investigators indicate that the destruction of the vitamin is greatly increased in the presence of a chemical substance which acts as a catalyzer, or substance which by its presence increases the intensity of chemical reactions. A series of animal experiments showed that copper acts as such a catalyzer and in its presence the vitamin was greatly reduced by heating. Since milk is frequently pasteurized in copper utensils and since it is one of the chief sources of this important vitamin, the investigators declare that this discovery is an important one and should receive careful attention. It has long been known that the heavy metals vitiate certain enzymes, such as pepsin, and the similar destruction of milk vitamins is another link in the chain of evidence toward proving that the vitamins are enzyme-like substances.

METHANOL (WOOD ALCOHOL) SYNTHESIZED.—Methyl alcohol, otherwise known as wood alcohol or methanol, is now being made by the chemical combination of carbon monoxide gas and hydrogen at the great German chemical factory of the Badische Anilin und Soda Fabrik at Ludwisghafen, according to recent advices.

The manufacture of this essential raw material in many chemical industries is now effected on the large scale by the direct union of the two gases in the presence of an activating substance or catalyst. The gas mixture is heated to a high temperature and subjected to high pressures.

Enough methyl alcohol is now being produced, the reports state, to provide for all of Germany's requirements. Among its uses is that of raw material for the manufacture of formaldehyde, which in turn is used as raw material in the making of artificial resins.

THE DIVERSIFIED USES OF ETHYLENE GAS.—The ethylene process for coloring mature citrus fruit, a method developed by the Bureau of Chemistry, United States Department of Agriculture, is now being generally used in California, according to recent reports. The use of ethylene displaces entirely the old process of bleaching by means of coal-oil burners with or without special humidifires.

In the new method the ethylene is merely forced into the sweat room, and if the room is tight only about 1 cubic foot of the gas will be needed twice daily for 5000 cubic feet of air space. If the "gassing" is done under canvas the quantity of ethylene is doubled. The coloring, depending on the amount of green color in the fruit, is accomplished usually in two or three days, the maximum being five days and the minimum one and one-half days. The proper temperature for oranges is from 70 to 75 degrees and for lemons from 60 to 65 degrees. The "gassing" has also been done by forcing the ethylene into cars already loaded. Five cubic feet per car per day has been found to do the work.

The cost of bleaching by this process runs from thirty-four cents to eighty cents per car of fruit, depending upon the length of time and the number of gas applications per day. It will be interesting to recall that ethylene leaking into a flower-house in Chicago was found to cause carnations to go to sleep. This led to application of the gas to human beings for purposes of anæsthesia. It worked out successfully. Recently, however, an explosion occurring in an operating room, where ethylene was being used as an anæsthetic, led to the death of the patient. This may militate against its wider use in this role.

Vagrant and injurious X-rays may be confined in a room in which they originate by the use of barium in plaster or paint, according to a statement made to the American Institute of Electrical Engineers by Prof. Toch, a chemist in New York City. Long exposure to X-rays which have escaped from doctors' offices through walls, floors, or ceiling, have been reported to have caused serious injury to persons in adjoining rooms, Prof. Toch said. To prevent this, lead which is impervious to the rays has been used in metallic form as a sheathing of X-ray rooms; but the metal is heavy and buildings with rooms so equipped require strengthening.

This is not necessary if some compound of barium be used instead of lead, Prof. Toch said, since barium compounds are opaque to X-rays. His method has been either to mix the barium with the wall plaster or to use barium compounds in the wall paint. Either method keeps the rays where they belong, he stated.—*Science Service.*

RANCIDITY.—The tendency of many fats to acquire disagreeable odor and taste is a matter of common knowledge, but the explanation of the changes producing these properties has not been given. Chevreul, in the early part of the nineteenth century elucidated the general nature of fats and oils, and since his time a vast amount of detailed information has been obtained and many new forms made familiar. It was early suggested that rancidity is merely the development of some volatile acid, such as butyric, but investigation showed the untenability of this view. Recently, Wilmer C. Powick, of the United States Bureau of Animal Industry, has made an extensive research into the problem. His results are published in *Jour. Agric. Res.*, 1923, *26*, 323. His conclusions are as follows:

1. The odor of heptylic aldehyde ($C_7 H_{14} O$) in itself and in association with fresh fats seems to justify Scala's view that this substance is fundamentally responsible for the characteristic rancid odor.

2. A long list of acids, aldehydes and volatile derivatives from fats is given, all of which are excluded as having any concern with the condition. Nonylic aldehyde ($C_9 H_{18} O$) however, may be partly responsible. Other substances, yet not isolated definitely, may take part in determining rancidity. Kreis' test—the use of a hydrochloric acid—phloroglucin mixture—was found not to be absolutely definite, as usually applied, but by a special spectroscopic method it may be made trustworthy. Non-rancid cottonseed oil, will, for instance, give a color under the ordinary method of the test. Powick discusses at some length the chemistry of rancidity production, giving a very complicated view, which is mainly indicative of oxidation of oleic acid. No discussion is presented as to the determining influences, but this phase is really outside the scope of the investigation. The view generally entertained is that protein matters are responsible for fermentive influences, but this is mere speculation at present.—H. L.

VITAMIN B IN CRYSTALLINE FORM.—One of the vitamins, the mysterious and unisolated food factors, has at last been obtained in a state of such purity that its early identification may be anticipated with certainty.

Dr. Atherton Seidell, chemist at the United States Public Health Service Hygienic Laboratory here, announced recently that

he has been able to prepare from brewer's yeast a definitely crystalline compound that has the antineuritic properties of vitamin B.

He used Fuller's earth to adsorb from a solution of yeast the active vitamin principle and after precipitating with picric acid and subjecting this product to many solutions and crystallizations, pale yellow, transparent, crystalline flakes were obtained that in doses as minute as two milligrams a day protect pigeons from the serious effects that follow lack of vitamin B.

When a chemist obtains a crystalline substance it is usually only a matter of time until its identity can be established and its true chemical structure determined. With this information its synthesis frequently becomes possible.

"There has been a tendency in the past to regard vitamins as substances comparable with enzymes and toxins in their instability and marked activity of infinitesimal doses," said Dr. Seidell. "Acceptance of this view has, no doubt, deterred many from work on this problem, since the possibility of isolating substances of the nature of enzymes is very remote. It is distinctly encouraging, therefore, to obtain evidence that the antineuritic vitamin performs its function in doses of convenient magnitude and withstands ordinary laboratory manipulations. Assuming a satisfactory demonstration of these points, the final solution of the true chemical nature of vitamins may be anticipated with certainty."—*Science Service.*

Honey-Water as a Non-Freezing Engine-Cooler.—During last winter practical automobilists and truck drivers in five different states made careful tests with a simple mixture of honey and water used as a cooling medium in the automobile engine, and, without exception, pronounced it superior to the alcohol and other non-freezing solutions they had tried. The tests reported were made in Illinois, Ohio, New York, Vermont, and Wisconsin, all of which states have severe winter weather.

The honey-water generally used—a half-and-half mixture—does not boil until a temperature of 220 degrees Fahrenheit is reached, thereby ensuring a cooling by conductivity, instead of by radiation, for eight degrees above the boiling point of water, and thereby also lessening evaporation. The boiling point of the alcohol mixture is below that of water.

When the honey-water is boiled, only the water evaporates, the honey remaining behind unaffected. The percentage of honey in the

solution remaining is thereby increased, and the freezing-point is correspondingly lowered.

And since the honey does not evaporate, little, if any, need be added after the cooling system of the car is first filled at the beginning of the winter season, the only care being that of keeping the system supplied with water as often as it is needed.

Allow one gallon of honey for each two gallons of radiator capacity, if a half-and-half solution is to be used. This gives a mixture a trifle richer in honey than in water, as honey weighs about twelve pounds to the gallon.

A complete union of the honey and water is said to be essential. And since they do not unite readily when cold, the desired result can best be attained by first heating the water and then stirring the honey into it, after which it should be boiled for several minutes. If straining is necessary, nothing is better for the purpose than a piece of wet flannel.

Illinois experiments showed that equal proportions of honey and water united by boiling formed a mixture that did not lose its fluidity until a temperature of two degrees below zero Fahrenheit was reached, at which point it assumed a mushy condition; and that a solution containing 66 per cent. of honey did not freeze at 12 degrees below.—*Scientific American.*

MEDICAL AND PHARMACEUTICAL NOTES

NEW DEVELOPMENTS IN THE TREATMENT OF AFRICAN SLEEPING SICKNESS.—Discovery that an American drug, tryparsamide, developed in the Rockefeller Institute and used in the treatment of paresis, can be substituted temporarily for the German drug used in the treatment of African sleeping sickness has been announced in London, according to a recent report.

The German drug is known as Bayer 205. Its formula is a carefully guarded secret which it has been hinted Germany would be willing to trade for the recovery of her former African possessions. Immense areas of central Africa have become unfit for human habitation because of the prevalence of the sleeping sickness which is caused by a parasite carried by the tsetse fly, and the Ger-

man remedy by its inventors to be a specific cure for the disease. It was brought out in the discussion in London that while its exact composition is unknown it is known to be a complex organic anilin substance of which the nucleus is trypan blue.

Some animals and men on whom Bayer 205 was used became drug fast, or resistant to the effects of the drug. Attempts to overcome this condition have resulted in the discovery that other remedies such as antimony tartrate or tryparsamide may be substituted temporarily for Bayer 205.

NARD LORE.—"Nard," or more commonly "spikenard," is the rootstock of the *Nardostachys jatamansi* (Roxb.) DC. of the family Valerianaceæ. It is tall-growing herb found in the Himalayas and Hindu Kush. Its pharmacology and pharmacognosy are fuliy set forth in the standard textbooks and need not be given here. Its history and the folk-lore attaching to it have been made the subject of an essay by Wilfred H. Schoff, of the Philadelphia Commercial Museum, contributed to the *Journal of the American Oriental Society*. Schoff has given much attention to the literature of the Near East and the Orient proper, and brought out into the light much interesting matter concerning ancient commerce and the products with which it was occupied.

The earliest known mention of Nard is found in a Sanskrit work, in which it is used in an ointment intended as a love potion or philter. Several herbs are included in the formula, one of which is Nard, regarded as the symbol of immortal life and also as valuable remedy in fever. It is not certain, however, if the word "Nard" is of Sanskrit or Iranian origin. The specific name in the botanical title (jatamansi) is Sanskrit, and refers to the tufted form. In modern India, ointments are prepared from it, which among other properties are believed to promote the growth of hair. Schoff gives considerable information as to the mythologic lore of Nard, but to English-speaking peoples, the drug is best known by the references to it in the Bible, especially the allusion to the precious ointment in the alabaster box. It was an ingredient of the incense used in the Jewish Temple services. It is an interesting question as to how an ingredient of a Himalayan love-potion found its way into such use.

One naturally turns to Greek literature for the more scientific and systematic discussion of the substance, and we find Theophrastus, in his "History of Plants," dated in the third century before the present era, says that "aromatics come from Arabia, Media and India, but the choicest come from India," and mentions in connection with India products, spikenard.—H. L.

As Others See Us.—*The Schweizerische Apotheker-Zeitung* (1924, *62*, 127), contains a letter from a Swiss pharmacist, Helene B. Rordorf, now in Australia, but lately in the United States, who gives an account of the general conditions of drug-store business in these countries, as compared with Swiss conditions. The major portion of the letter is devoted to conditions in Brisbane, Queensland, a city of about 250,000 population. American conditions were principally observed in the extreme West. Some abstracts of her views and comparisons may be of interest.

> "The American apothecary has become a merchant, the shop a magazine, and the income from ice cream, soda water, candy, photographic materials, alarm-clocks, umbrellas, stationery, and other things, exceed that derived from the sale of pharmaceutical specialties. Prescription business is quite minor, and a 'dispensing department' is often absent. Two large companies, 'Owl' and 'Sun,' dominate in California, and in their shops one can find almost anything outside of clothing, household articles, ornaments and ordinary food products. Postal and telegraph facilities are offered and a dozen booths for telephones are to be found in the larger branches. One is astounded at the business and inclined to ask how such a place can be termed a 'drug store.' Other places that call themselves 'pharmacies' or 'chemist shops' are in principle conducted the same. Only one establishment—in Los Angeles—recalled the home conditions. It was designated 'French Pharmacy.' In San Francisco, a Chinese drug store was visited. Most of the articles were contained in decorated porcelain jars and drawers, and could not be seen. A young Chinese assistant was making pills, an apprentice was chopping sarsaparilla on a wooden block, the chief was writing directions in Chinese characters, and another assistant was lettering a label in Chinese. Ginger, sarsaparilla and other familiar drugs were on hand, with some unknown ones. The attendants and customers were all Chinese. (The store was in Chinatown.) The chief was polite, but spoke English imperfectly and it was deemed inadvisable to bother him with questions."
>
> H. L.

Two New Cocculus Alkaloids.—*Cocculus diversifolius* D. C. is a plant belonging to menispermaceæ, and is called *menispermum diversifolius* or *sinomenium diversifolius.* It is an Oriental plant, which grows wild in the southern part of Japan. The extract of this plant has been used a long time by the Japanese as a diuretic or for rheumatism, chronic gastritis or enteritis. Ohta has found two new alkaloids of this plant, kukolin (cucolinum) and diversin (diversium). He reports the results of chemical and pharmacologic studies of these substances.—*Journ. A. M. A.*

Color Test for Chloroform and Chloral Hydrate.—The red color produced on heating chloroform, bromoform, iodoform and chloral hydrate with aqueous sodium hydroxid and pyridine is used by Ross to identify these compounds; and, further, to identify substances which produce these compounds under given conditions and in amounts inferior to 0.005 mg. Piperidine and quinoline do not produce this color.

What Should a Pharmacist Know?—For years men have speculated regarding the knowledge a pharmacist should have to enable him to discharge his duties properly. The men who have had the responsibility of this training have been always seeking to improve their methods of equipping the prospective pharmacist with the knowledge necessary for successful public service. Progress in pharmaceutical education may be chiefly attributed to this keen desire to improve methods.

The Commonwealth Fund, in conjunction with a committee of the American Conference of Pharmaceutical Faculties, has undertaken the study of pharmaceutical education from the functional point of view.

The director of the research, Dr. W. W. Charters, of Pittsburgh, who has had a wide and successful experience in this kind of work, is being assisted by Professors Lemon and Monell, of the Buffalo College of Pharmacy. Dr. J. A. Koch, Dean of the Pittsburgh College of Pharmacy, is chairman of the committee of the American Conference of Pharmaceutical Faculties. On this committee are men eminently qualified for the work by training and inclination, for which reason valuable results are expected from the research. Following are the members of the committee: Dr. H.

H. Rusby, dean of the New York College of Pharmacy; Dr. Clair A. Dye, dean of the School of Pharmacy of the Ohio State University; Dr. Wortley F. Rudd, dean of the School of Pharmacy of the Medical College of Virginia, and Dr. Rufus A. Lyman, dean of the College of Pharmacy of the University of Nebraska. President Charles W. Johnson, dean of the College of Pharmacy of the University of Washington, also attended the meeting, and is actively assisting in the work.

It is intended to make the survey both intensive and comprehensive so that the data afforded may serve as a proper basis in determining the knowledge a pharmacist should have to serve the public adequately. This will necessitate a careful study of all sorts and conditions of stores in the most widely diverse localities to insure proper results.

NEWS ITEMS AND PERSONAL NOTES

FACULTY AND TRUSTEE MEMBERS ENTERTAIN CAST OF FOUNDERS' DAY PLAY AT PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE.—On Thursday evening, March 6th, an enjoyable evening was spent at the Arcadia Cafe, one of the foremost of Philadelphia's fashionable restaurants, upon the occasion of a dinner given by members of the faculty and board of trustees of the Philadelphia College of Pharmacy and Science to the student members of the clever play, "Pharmacy as Was and Is," that was given on Founders' Day at the College.

There were present as hosts the following faculty and board members:

Admiral Wm. C. Braisted	Mr. Joseph W. England
Mr. Paul A. Kind	Mr. Theodore Campbell
Mr. Walter Smith	Dean Chas. H. LaWall
Mr. Milton Campbell	Dean J. W. Sturmer
Dr. Wm. Duffield Robinson	Prof. Frank X. Moerk
Mr. Wm. L. Cliffe	Prof. F. P. Stroup
Mr. Josiah C. Peacock	Prof. E. Fullerton Cook
Mr. Richard H. Lackey	Prof. Arno Viehoever
Mr. O. W. Osterlund	Prof. Horatio C. Wood
Mr. Otto Kraus	Prof. Ivor Griffith
Mr. Russell T. Blackwood	Prof. Ralph R. Foran

The guests included the following members of the cast and orchestra as well as the author, Mr. Ruth:

Miss Lillian S. Rappaport	Robert T. Wylie
Miss Teresa M. Rackie	Miss Mary Timko
Miss Eunice Weeks	Miss Adeline Myers
Miss Gertrude Black	Miss Clara Parris
C. C. Pines	C. W. McConnell
E. A. Novak	S. Berman
A. H. Nowak	J. B. Braverman
L. G. Freeman	G. F. Morrin
Philip Forman	M. J. Beck
Miss Edith Ludlow	Prof. Edw. J. Hughes
Miss Rae Beard	Prof. Adley B. Nichols
Miss Kathryn Urch	E. J. Murphy
A. Lee Caldwell	E. M. Nicholls
E. L. Bonn	Howard Smith, Jr.
J. Sandler	S. M. Wanamaker
J. R. Katzman	L. C. Cope
Marcus A. Rothman	E. P. Challenger

Harry Shafer

Mr. Ambrose Hunsberger acted as toastmaster and the evening was spent in speechmaking and dancing.

The play was such a success that its repetition has been requested for commencement week.

THE WELLCOME FOUNDATION.—The Wellcome Foundation, Ltd., has recently been registered as a private limited company with a capital of £1,000,000 to acquire from Mr. Henry S. Wellcome the well-known business of Burroughs, Wellcome & Co., and the various scientific institutions founded and owned by Mr. Wellcome, who will be the governing director of the foundation during his life. We understand that the foundation has been formed entirely for private and family reasons, and that the conduct and management of the business will in no way be interfered with, but will be continued on exactly the same lines as heretofore. The scientific institutions will also continue as in the past under separate scientific direction. A marked indication of the world-wide nature of the

firm's business and its continuous development is to be found in the new offices of Burroughs, Wellcome & Co., in New York. Here, in order to provide adequate general office accommodation to cope with the greatly-increased demand for the firm's products in America, a site was acquired last year at 9 and 11 East Forty-first Street, and a steel-framed, twelve-story, fireproof building erected thereon. This building, in the heart of the most select business centre of New York City, is regarded as one of the finest examples of Gothic architecture, as applied to office buildings, in the United States. Space does not permit the mention of more than one or two recent products issued by Burroughs, Wellcome & Co. "Neokharsivan," an organic arsenical preparation, was produced by Burroughs, Wellcome & Co. when supplies of neosalvarsan were unobtainable. It was the first novarseno-benzol product to be manufactured in the British Empire, and is issued under license and approved by the British Board of Trade and the Ministry of Health; also approved by the Local Government Boards of England, Scotland and Ireland for use under the Public Health (Venereal Diseases) Regulations. It combines the minimum toxicity with the maximum therapeutic efficiency, and it yields similar therapeutic results to salvarsan with a much simpler technique. "Moogrol," a mixture of esters of acids of the chaulmoogric series, and the outcome of investigations extending from 1904 to the present time, is a noteworthy contribution to the successful treatment of leprosy. Insulin is too well known to need more than passing mention. These few selected instances of pioneer scientific work in the field of modern materia medica are but examples of the many triumphs in the field attained by Burroughs, Wellcome & Co. The conduct and management of this great scientific business will be continued on exactly the same lines as heretofore, and doubtless it will achieve in the future, triumphs which will equal, if they do not even excel, those of the past.

FOUNDERS' DAY AT THE PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE FITTINGLY CELEBRATED.—On Saturday, February 23d, the officers, faculty, alumni and members of the Philadelphia College of Pharmacy fittingly celebrated the 103d anniversary of the founding of the college.

The main program was 2 P. M. in the College Museum and Auditorium. In the presence of an audience of nearly 500, including members of the senior class, faculty members and officers of the college, and many of the older alumni and guests, a two-act dramatic sketch entitled, "Pharmacy as Was and Is," was presented by the students. The sketch, which was written by Robert J. Ruth, P. D., 1913, who is now field secretary of the campaign and endowment fund, was in two acts and two scenes.

The first scene showed a pharmacy of 1821 on the day of the original founding of the college. The original Glentworth store fixtures and equipment were used as a setting and the proprietor, clerks, and customers were costumed in the garb of a century ago. A very careful portrayal of customs, language, character of trade, etc., was shown and the dignity of the calling of the conscientious apothecary of the time was particularly emphasized.

The second scene was shown in a modern suburban store of the present. The fixtures were furnished by Bernheim and Sons, the cash register by the National Cash Register Company, and the stock and decorations by George B. Evans, of Philadelphia.

An equally admirable portrayal of present conditions in pharmacy was shown. The dialogue was witty and sparkling and special interest was afforded by the participation of several of the members of the faculty in the role of customers.

Again the dominant and final note touched was the dignity and responsibility of the calling of the pharmacist.

After the presentation of the play the new college song was sung, the words of which were written by Professor Sturmer and the music by Professor Viehoever, both of the college faculty.

Brief addresses were made by President Braisted and Deans Sturmer and LaWall.

Music for the entire program was furnished by the senior class orchestra, which is developing splendidly.

In the evening of the same day a dance was given to the students and friends of the college, by the faculty and the alumni.

Several hundred were present upon this occasion also, and enjoyed the dancing and the light refreshments which were served.

The senior class orchestra also officiated at the dance and again covered themselves with glory.

PLAUT RESEARCH FUND.—Dr. Edward Plaut, president of Lehn & Fink, Incorporated, New York, has presented the Harriman Research Laboratory with the sum of $300 for the year 1924, to be known as the "Plaut Research Fund for Studies in Internal Medicine." This fund is to aid in the investigation of the effects of certain therapeutic agents, especially the endocrine glands. Dr. K. G. Falk has been placed in charge of this work by Dr. W. G. Lyle, director of the Harriman Research Laboratory.

POISON IVY AND MAH-JONG.—Ivy poisoning (dermatitis venenata), is no longer restricted to the summer months or to the growing season of *Rhus toxicodendron*. It bids fair to become a perennial rather than a seasonal affliction. Physicians are likely to meet with cases in winter as well as in summer, and among the "cliff dwellers" of the modern apartment houses of our large cities as well as among those who frequent the open spaces.

It appears that the common poison ivy, *Rhus toxicodendron*, and five closely related species grow in Japan, and that the Chinese and Japanese use a varnish in their lacquer work which contains an oil derived from one of these. This lacquer is extensively used in finishing Mah-Jong sets and often contains an appreciable quantity of the poisonous principle. The recent phenomenal rise of Mah-Jong to popularity has been accompanied by reports in medical journals of cases of poisoning in which the lacquer was definitely incriminated.

The exact chemical nature of the poisonous principle has long been disputed. Pfaff, in 1897, isolated a nonvolatile oily substance. One later worker claimed it to be a polyhydric phenol, and another, an acid glucoside.

Chemists in the Mulford Laboratory have succeeded in preparing an extract of Rhus toxicodendron which is almost free from chlorophyll, tannin, gums and resins. The resulting extract, when evaporated, leaves a grayish, solid, fatty material which appears, from tests, to be a fairly definite compound. Though the chemical study is not yet complete, the substance appears to be a fixed oil, solid at ordinary temperatures.

One result of this work is that a preparation has now been made available for clinical use. The substance is soluble in vege-

table oils and is supplied in solution in cottonseed oil. It is marketed in two strengths, of 1:1000 and 1:5000, and is put up in a handy collapsible-tube syringe.

This product from the Mulford laboratories is probably the nearest approach to the purified active principle, and it is anticipated that it will be widely used by physicians, with the idea of definitely establishing its prophylactic value. Those interested are invited to correspond with the H. K. Mulford Company, Philadelphia, Pa., and mention this publication.

BOOK REVIEWS

NAHRUNGS-UND GENUSSMITTEL. IHRE UNTERSUCHUNG. I HALFTE. Bearbeitet von Prof. Dr. P. Buttenberg, Hamburg; Prof. Dr. C. Griebel, Charlottenburg; Dr. E. Schowalter, Erlangen; Prof. Dr. Edward Spaeth, Erlangen; Dr. R. Strohecker, Frankfurt a. M.; Prof. Dr. Josef Tillmanns, Frankfurt a. M. Mit 193 Abbildungen. 976 pp. Lexicon. Urban & Schwarzenberg, Berlin N. 24. Wien I.

The volume before us, three books, constitutes the first half of The Analysis of Foods, which is part 8 of The Applied Chemical and Physical Methods of that classic work, *"Handbuch der biologischen Arbeitsmethoden,"* by Geh. Med.—Rt. Prof. Dr. med. et phil. h. c. Emil Abderhalden, Director of the Physiological Institute of the University Halle a. d. S., together with the co-operation of about 500 specialists in their respective fields. The "Handbuch" is arranged into thirteen divisions with proper sub-divisions or parts (as many as twelve in some instances), and covers the entire field of physical, chemical and biological methods, technique and research. Verily, a master work!

The actual scope of the volume before us can be appreciated from the following principal chapter headings: Chemical and Microscopical Analysis of Cereals, Malt, Flour, Starches, Infant Foods, Bread and Cake, Baking Powders and Yeast; Dried and Canned Vegetables and Fruits; Fruit Juices, Syrups and Drinks; Preserves and Jellies; Chemical and Microscopical Analysis of Spices; Eggs; Milk; Cheese; Edible Oils and Fats; Meat, Etc.; Coffee, Tea, Cacao and Substitutes (Chemical and Microscopical Analysis); Vinegar and Salt.

What a variety of subjects and what a systematic arrangement! It is a collection of the very best methods of analysis, the inferior ones not being mentioned, so as to make the work a real work-book, a practical hand-book and a valuable reference book. The different chapters have been prepared by specialists and can therefore be thoroughly relied upon. It is the aim of *Aberhalden* to produce the very best and nothing but the very best, in each respective field. The chapters on spices are exceptionally good. The microscopical

analysis, pages 345 to 425, is wrtten by Prof. Dr. phil. C. Griebel, of Charlottenburg, and contains a whole lot of fine illustrations to elucidate the text. The chemical analysis, pages 422 to 526, is by Prof. Dr. Edmund Spaeth, in Erlangen, well-known by his many papers also, in the German pharmaceutical journals. In both these chapters, microscopical and chemical, we sadly miss the inclusion of "Saigon" Cinnamon.

On pages 674 to 677 we find an excellent Table on the Analytical Constants of Fats and Oils, which is of great benefit. It is systematically arranged into Animal Oils and Fats and Vegetable Oils and Fats. The latter are again divided into Solid, Non-drying, Semi-dring and Drying. In the chapters on the chemical and microscopical analysis of Coffee, Tea and Cacao, a large variety of substitutes which came into use during the war are also included and proper methods of detection are given. The chapters on Vinegar and Salt, by Prof. Dr. phil. E. Spaeth, in Erlangen, are especially interesting and instructive and should be studied with proper care by pharmacists.

The volume before us is a masterwork, a practical hand-book and an authoritative reference book, a true document showing the status of the chemical and microscopical analysis of the foods treated. The second part, which is soon to be published, will contain Honey, Sugar, Water, Mineral Waters, Alcohol, Tobacco, etc. When completed, both parts will constitute a library by itself on the Analysis of Foods, which is indeed a real contribution to this field of science. There is no question that this work should form an indispensable member of the libraries of laboratories and colleges and should be of great value to the chemist, microscopist and research worker and also to the pharmacist.

OTTO RAUBENHEIMER, Ph. M.

CHEMICAL CALCULATIONS. By R. Harman Ashley, Ph. D., Professor of Chemistry, Tufts College Premedical and Dental School. Illustrated. Third edition. Revised. 12 mo 276 pp. Cloth, $3. D. Van Nostrand Co., New York, 1923.

The first edition of this excellent book was published in 1915, which is a vivid proof of its popularity and usefulness. The sub-

jects dealt with are: Ratios, Approximate Numbers, Interpolation, Heat, Specific Gravity, Gas Calculations, Atomic Weights and Formulas, Gravimetric and Volumetric Analysis and Use of Specific Gravity Tables and Acid Calculations.

The problems are numerous and of varying degree of difficulty. The method of solving the problems is treated in the text and typical problems are solved at the end of the reading matter. For convenience of instructor and student the answers are attached to each problem. The third edition before us has been thoroughly revised and Chapter II on Approximate Numbers has been completely rewritten and new material added which greatly improve the value of the book.

We can highly recommend this work, not only to students of pharmacy and chemistry, but also to mature pharmacists and chemists, who will find it extremely useful in their daily work.

OTTO RAUBENHEIMER, Ph. M.

BUSINESS FUNDAMENTALS—HOW TO BECOME A SUCCESSFUL BUSINESS MAN. By Roger W. Babson. 12 mo. 228 pp. Cloth, $2. B. C. Forbes Publishing Co., New York.

When business men think of business statistics today, they immediately think of Roger W. Babson. Until Babson, the trained engineer from the Massachusetts Institute of Technology, applied his mind to them, business statistics were rather unrelated things. Babson, the pioneer, took hold of them and through his research and writings contributed invaluably to the progress and prosperity of American business and the American people.

The author also discovered that through all the apparently tangled skein of material statistics there were laws so immutable and unchangeable as the Almighty, laws that can no more be departed from with impunity than the Golden Rule. The book before us acquaints us with these fundamental laws and points out the way to follow them successfuly. It is the result of a twenty-year study of one hundred years of business. They have been found practicable and profitable by thousands of business men. These fundamentals apply to every one at some stage of his career. Every man who

succeeds employs them, consciously or unconsciously, and it is safe to say that you will "get there quicker if you know where you are going."

Every chapter, every page of the book is crammed full of money-making ideas, plans and facts which you can apply at once to a very profitable operation in your business. Every step is made clear, definite and concrete. Pharmacists and druggists have always been considered as poor business men, and perhaps rightly so. It is therefore to their interest to study this book and apply these "Business Fundamentals." The price of the book is only nominal and it can also be obtained with one year's subscription to *Forbes' Magazine* for $5. After all, even the professional and scientific pharmacist should make money!

OTTO RAUBENHEIMER, Ph. M.

THE A B C OF ATOMS. By Bertrand Russell, F. R. S. Author of "Mysticism and Logic," "The Analysis of Mind," etc. 12 mo. 162 pp. Cloth, $2. E. P. Dutton & Company, 681 Fifth Avenue, New York.

An introduction to the new physics, by an author who is internationally known for his power of writing graphic and simple English, as well as for his scientific attainments.

In the last few years the study of Radioactivity and X-rays, and the application of the spectroscope to the problem of the constitution of matter have brought about amazing advances in our knowledge of the properties and nature of the atom. Instead of the atom being regarded as the indestructible unit of matter, it is now found to be a complicated miniature solar system, a few billionths of a centimeter in diameter, with its planet electrons revolving about their nucleus-sun as many as seven billion times in a second.

Into this fascinating wonderland of the infinitely small yet infinitely complex and infinitely full of energy, Mr. Russell introduces us, telling us how the velocities and masses of these minute quantities are studied and measured; how the totally new laws of dynamics —which seem to hint at discontinuity both in space and time— have been discovered; what the most recent theories have to say

about the electron-rings and the internal structure of the atom; how the peculiarities of the hydrogen spectrum are accounted for, and very many other intensely interesting things.

Besides these, the quantum theory, relativity, the wave theory of light, the whole subject of Radioactivity and X-rays are treated by the author, who manages to give a thoroughly practical working idea of these complicated subjects in plain simple language.

We can highly recommend this excellent book to all interested, but regret very much the absence of an index.

OTTO RAUBENHEIMER, Ph. M.